For CONTENTS, see page iii and iv of Cover.

pp. 61-116.] [July 15, 1914.

TROPICAL DISEASES BULLETIN

Vol. 4. 1914. No. 2.

EXCHANGE COPY

IMPERIAL INSTITUTE 22 JUL 1914 LIBRARY

ISSUED UNDER
THE DIRECTION OF THE
HONORARY MANAGING COMMITTEE
OF THE
TROPICAL DISEASES
BUREAU.

General Editor:
THE DIRECTOR OF THE BUREAU.

COMMONWEALTH MYCOLOGICAL INSTITUTE 26 MAY 1971

London:
TROPICAL DISEASES BUREAU,
Imperial Institute, S.W.

Sold by BAILLIÈRE, TINDALL & COX,
8, Henrietta Street, Covent Garden, W.C.

Price 1/6 net.] [All Rights Reserved.

HONORARY MANAGING COMMITTEE.

Chairman:

The Right Honourable Sir J. West Ridgeway, G.C.B., G.C.M.G., K.C.S.I., LL.D.
(who is also Chairman of the Advisory Committee of the Tropical Diseases Research Fund).

Sir John Rose Bradford, K.C.M.G., F.R.S.
(representing the Royal Society).

Surgeon-General Sir David Bruce, C.B., F.R.S.
Surgeon-General Sir R. Havelock Charles, I.M.S., G.C.V.O.
Colonel Sir William B. Leishman, R.A.M.C., F.R.S., K.H.P.
Sir John M'Fadyean, M.R.C.V.S.
Sir Patrick Manson, G.C.M.G., F.R.S.
Sir Ronald Ross, K.C.B., F.R.S.
Sir S. Stockman, M.R.C.V.S.
Mr. J. A. C. Tilley
(representing the Foreign Office and Sudan Government).
Mr. H. J. Read, C.B., C.M.G.
(representing the Colonial Office),
with
Mr. A. Berriedale Keith, D.C.L., D.Litt.
of the Colonial Office, as Secretary.

STAFF OF THE BUREAU.

Director:

A. G. Bagshawe, M.B., B.C., D.P.H. Cantab.,
of the Uganda Medical Staff.

Assistant Director:

G. C. Low, M.A., M.D., *Lecturer, London School of Tropical Medicine.*

Librarian:

R. L. Sheppard.

Sectional Editors:

Philip H. Bahr, M.A., M.D., D.T.M. & H. Cantab.
Andrew Balfour, C.M.G., M.D., D.P.H. Cantab.
Fleet-Surgeon P. W. Bassett-Smith, R.N., C.B., M.R.C.P.
Major S. Lyle Cummins, R.A.M.C., M.B., B.Ch.
H. B. Fantham, B.A., D.Sc.
Edward Hindle, Ph.D.
Colonel W. G. King, C.I.E., I.M.S. (retd.).
R. T. Leiper, D.Sc., M.B., Ch.B.
J. B. Nias, M.D., M.R.C.P.
F. M. Sandwith, M.D., F.R.C.P.
J. Henderson Smith, M.B., Ch.B.
C. M. Wenyon, M.B., B.S., B.Sc.
Warrington Yorke, M.D.

Editor of the Tropical Veterinary Bulletin:

A. Leslie Sheather, B.Sc., M.R.C.V.S.

A Text Book of
MEDICAL ENTOMOLOGY
BY
WALTER SCOTT PATTON, M.B. (Edin.), I.M.S.
King Instit. of Preventive Medicine, Guindy, Madras,
AND
FRANCIS WILLIAM CRAGG, M.D. (Edin.), I.M.S.
Central Research Institute, Kasauli, Punjab,
Crown quarto, 768 pp., with 89 full-page plates.
PRICE £1. 1. 0. NET.
CHRISTIAN LITERATURE SOCIETY,
35, John Street, Bedford Row, London, W.C.

"The amount of information in the book is prodigious, and we strongly commend it."—*Knowledge.*
"A sound book of reference for those who wish to investigate experimentally the natural history of insect-borne disease."—*Tropical Diseases Bulletin.*
"A work which is creditable to the authors in the highest degree. It deals systematically and scientifically with the whole class of insects,"—*The Athenæum.*

Now Ready. Price 7/6 net.
The Care
AND
Treatment of European Children
IN THE
Tropics.
BY G MONTAGU HARSTON M.D.Lond.
BAILLIÈRE, TINDALL & COX,
8, Henrietta Street, Covent Garden, London.

TRADE MARK **'TABLOID'** BRAND
QUININE INJECTION POCKET-CASE, NO. 45

Designed to simplify the preparation of aseptic hypodermic doses of Quinine and to ensure safety in their injection.

Ideal for practitioners in malarial and plague districts.

The case measures 5¼ × 2⅞ × 1¼ in. In nickel-plated metal, with doeskin cover. Price in London **35/0**
Of all Pharmacists

BURROUGHS WELLCOME & CO., LONDON
New York Montreal Sydney
Cape Town Milan Shanghai
Buenos Aires Bombay
xx 538 *Copyright*

TELEGRAMS—"PUBLICAVIT, EUSROAD, LONDON."

H. K. LEWIS,

ESTABLISHED 1844.

MEDICAL PUBLISHER AND BOOKSELLER.

Careful attention to Orders by Post, and from the Colonies and Abroad.

All Books specially packed for Book or Parcel Post, according to destination. Postage only charged.

COLONIAL LIBRARIES, COLLEGES and SIMILAR INSTITUTIONS—
Special facilities for executing Large Orders for Shipment to all parts of the World, including INDIA, AUSTRALIA, &c.

H. K. LEWIS begs to point out that he can execute direct orders by return mails for the Publications of **ALL PUBLISHERS.**

Quarterly List of New Books sent post free.
PERIODICALS, ENGLISH & FOREIGN, at Subscription Rates.
Books in General Literature not in Stock, supplied to Order.

136, GOWER STREET, and 24, GOWER PLACE, LONDON, W C.

Leitz
LONDON

MICRO-OBJECTIVES

The Glasses of which our Objectives are made up are exclusively of a kind which long experience has shown to be unaffected by atmospheric influences. The lenses are in particular not liable to undergo spontaneous changes.
The following is a selection from our Catalogue of recently improved Lenses:—

			£	s.	d.
FLUORITE.					
1/6 in.	... ...	0·82 N.A.	2	0	0
1/8 in.	... ...	0·85 N.A.	2	0	0
1/8 in.	(double fluorite)	0·95 N.A.	3	5	0
1/10in.	... ...	0·87 N.A.	2	0	0
1/11in.	... ...	0·87 N.A.	3	10	0
1/12in.	oil immersion	1·32 N.A.	6	10	0
1/16in.	do.	1·32 N.A.	7	10	0
APOCHROMATIC.					
16 mm.	... ...	0·30 N.A.	3	0	0
8 mm.	... ...	0·65 N.A.	4	0	0
4 mm.	... ...	0·95 N.A.	6	0	0
3 mm.	... ...	0·95 N.A.	6	10	0
2 mm.	oil immersion	1·32 N.A.	12	10	0
2 mm.	do.	1·40 N.A.	16	5	0

18, BLOOMSBURY SQUARE, W.C.
(A few doors from the British Museum.)

HOWARDS' QUININE.

(Howards & Sons, Ltd., are the **only** makers of Quinine Sulph. in England).

It is essential to use only the purest Quinine and tablets of accurate dose. To ensure this specify Howards' English Products.

ANÆSTHETIC AETHERS IN SEALED TUBES FOR THE TROPICS.

HOWARDS & SONS, Ltd. Ilford & Stratford, London, E.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 4.] 1914. [No. 2.

SLEEPING SICKNESS.

BRUCE (David), HAMERTON (A. E.), WATSON (D. P.) & Lady BRUCE. **Description of a Strain of *Trypanosoma brucei* from Zululand. Part I.—Morphology.**—*Proc. Roy. Soc.* 1914. June 4. Vol. B. 87. No. B 598. pp. 493–510. With 3 plates.

In an introduction the history of the strain is given. The trypanosome was obtained by Mr. A. W. SHILSTON from a mule naturally infected at Somkele in Zululand. After passage through various laboratory animals at Pietermaritzburg it was forwarded to Pretoria and thence by Mr. ROBERTSON to the Sleeping Sickness Camp at Kasu. The date at which the parasite was isolated from the mule is not given, but will be recorded in a subsequent paper.*

The Commission consider that this trypanosome is the same as that discovered by BRUCE in Zululand in 1894 and named *T. brucei* by PLIMMER and BRADFORD. The old Zululand strain is referred to as the 1896 strain, the new strain as the 1913 strain. The authors then quote passages from the original description of the 1896 strain by BRUCE and by KANTHACK, DURHAM and BLANDFORD indicating that the parasite was distinctly dimorphic. In 1898 the trypanosome was handed over to BRADFORD at the Brown Institute and named *T. brucei* by PLIMMER and BRADFORD in 1899. The authors write :—

" That the trypanosome named by PLIMMER and BRADFORD was the same as that sent to KANTHACK, DURHAM, and BLANDFORD in 1896, there can be no reasonable doubt. There was no other species of pathogenic trypanosome in any English laboratory at the time, with the exception, perhaps, of *T. lewisi*, with which there could be no confusion."

The 1896 strain is compared with the 1913 strain. Mr. SHILSTON had measured 400 individuals of the latter strain and the chart is reproduced in the present paper and compared with that constructed by the Commission from films of the old strain. The two curves are remarkably alike. Furthermore, when the action of the strains on various animals is compared the same likeness is seen. Hence the

* Assuming that this is the trypanosome described in SHILSTON'S "Notes on Zululand Trypanosomes," it was isolated towards the end of 1911 (*Trop. Vet. Bull.* Vol. 1, p. 277). A.G.B.

(C45) Wt.P10/46—10.3.4. 2,000. 7.14. B.&F.Ltd. Gp.11/4 A

Commission concludes that "the strain of trypanosome which forms the subject of this paper belongs to the species *T. brucei*, a well marked dimorphic type of trypanosome."

The object of the present paper is to describe as fully as possible the morphology of this new strain of *T. brucei* from Zululand in order to try and prove its identity with the trypanosomes causing disease in man in Rhodesia, Nyasaland, and German and Portuguese East Africa.

The length of the trypanosome as found in the monkey, dog, guinea-pig and rat, 1,000 trypanosomes in all, is recorded in a table.

Table II. Average length of *T. brucei*, Zululand strain, 1913.

Species of Animal.	Number of trypanosomes measured.	In microns.		
		Average Length.	Maximum Length.	Minimum Length.
Monkey	160	21·2	31·0	12·0
Dog	260	21·5	32·0	16·0
Guinea-pig	30 [80 ?]	22·9	35·0	17·0
Rat	500	20·8	28·0	17·0

The paper is illustrated by numerous biometric curves. The first of these gives the distribution by percentages in respect of length of 1,000 individuals of the 1913 strain. "It is very similar to some of the curves taken from the Nyasaland human strain. . . . But, on the other hand, it is very unlike some of the others." Then follow four other curves constructed from films made on nine consecutive days of the infection in a rat. In each case 500 trypanosomes were measured but in the first curve the original strain was used, whilst the 2nd, 3rd, and 4th curves represent the trypanosome after it had been passed once, twice and thrice through *G. morsitans*. This work showed that three passages through *G. morsitans* had little or no effect in changing the character of the trypanosome as regards its distribution of length.

Finally two other biometric curves are given and compared—the one constructed from 2,000 individuals of the 1913 strain of *T. brucei*, Zululand, taken on nine consecutive days of the infection in four rats and the other from 2,500 individuals of the trypanosome causing disease in man in Nyasaland, the 'wild game strain,' taken on nine consecutive days of the infection in five rats. The two curves are undoubtedly much alike.

The average breadth measured across the broadest part of the trypanosome of the long and slender forms is given as 2·76μ, that of the intermediate varieties as 3·25μ, and that of the short stumpy forms as 3·53μ. Regarding the other morphological characters of the trypanosome the authors were unable to discover any difference from those of the human trypanosome of Nyasaland.

The following are the conclusions :—

"1. The trypanosome described in this paper under the name of the 'Zululand strain, 1913,' is the same species as that discovered by Bruce in Zululand in 1894; reported on by Kanthack, Durham and Blandford in 1898; and named *T. brucei* by Plimmer and Bradford in 1899.

"2. As regards its morphology, this trypanosome is absolutely identical with the trypanosome causing disease in man in Nyasaland, the *T. rhodesiense* of Stephens and Fantham."

[The conclusions of Stephens and Blacklock are diametrically opposed to those of the authors (see this *Bulletin*, Vol. 1, p. 662).]

W. Yorke.

Bruce (David), Hamerton (A. E.), Watson (D. P.) & Lady Bruce. **Description of a Strain of *Trypanosoma brucei* from Zululand. Part II.—Susceptibility of Animals.**—*Proc. Roy. Soc.* 1914. June 4. Vol. B. 87. No. B: 598. pp. 511-516.

The pathogenicity of the Zululand trypanosome is described and compared with that of the Nyasaland *T. rhodesiense*. Details of the experiments are given in tables. A horse inoculated by Mr. Shilston at Pietermaritzburg died in 35 days with typical symptoms of nagana. Six oxen were inoculated but only two became infected; one of these died after 310 days and the other was alive at the end of a year when it had apparently recovered. Neither this nor the human trypanosome of Nyasaland therefore produces serious disease in cattle. Of seven goats four died on an average in 77·2 days (45–116), the remaining three were refractory. No oedema of the face or corneal opacity was noted. The Nyasaland trypanosome was rather more virulent in goats, killing them on an average in 41·8 days (19–72). Eight monkeys died, on an average, in 29·2 days (8–65); trypanosomes were always present in the blood, there was no oedema of the face or corneal opacity. Seventeen dogs died, on an average, in 18·5 days (12–26). In eight corneal opacity was a prominent symptom, and in two swellings of the limbs were observed. The duration of the disease in eight rabbits was 32·7 days (27–39). Guinea-pigs were less affected by the disease than rabbits and of the ten used four required to be inoculated more than once; average duration 43·7 days (15–89). Rats lived for an average of 27 days (10–58) with their blood swarming with trypanosomes and their spleens enormously enlarged.

The conclusion is:—

"The pathogenic action of *T. brucei*, Zululand strain, 1913, on various animals is so similar, not only in regard to the symptoms during life, but also in the post-mortem appearances and rate of mortality, to that of the trypanosome causing disease in man in Nyasaland, that it affords another proof that these two trypanosomes are identical."

W. Y.

Bruce (David), Hamerton (A. E.), Watson (D. P.) & Lady Bruce. **Description of a Strain of *Trypanosoma brucei* from Zululand. Part III.—Development in *Glossina morsitans*.**—*Proc. Roy. Soc.* 1914. June 4. Vol. B. 87. No. B. 598. pp. 526-531. With 1 coloured plate.

The chief object of this paper was to compare the development in *G. morsitans* of the 1913 Zululand strain of *T. brucei* with that causing disease in man in Nyasaland. Of seven experiments made with laboratory-bred flies three were positive and four negative. Two experiments made with wild flies were positive. In all 308 laboratory-bred flies were used and 47 infected flies found—15·3 per cent.

Table I.—Laboratory-bred Flies.

Date.	Expt.	No. of flies used.	Experiment positive or negative.	No. of infected flies found.	No. of days before flies became infective.	Temperature at which flies kept.
1913						
Feb. 11	1857	58	—	1		
„ 17	1909	50	+	10	21	?
Mar. 11	1988	45	+	20	13	84°F. (29°C.)
„ 17	1996	55	—	4		
April 25	2111	50	—	3		
May 26	2188	30	—	1		
June 23	2188A	20	+	8	14	84°F. (29°C.)

Details of the five positive experiments are given in a table. On an average 21 days elapse before the cycle of development of *T. brucei* Zululand, 1913, is complete in *G. morsitans* and the fly becomes infective. The results of dissection of the infected laboratory-bred flies are recorded in a table. In the first positive experiment (No. 1909) 10 infected flies were found; in three of these the salivary glands were swarming with trypanosomes, but in none was the labial cavity or hypopharynx involved. In the second experiment (No. 1988) 20 infected flies were found. In two the salivary glands were invaded and in one a few active trypanosomes were seen in the labial cavity and in another a few 'blood forms' were noted in the hypopharynx. In the third positive experiment (No. 2188A) eight infected flies were discovered one of which had the salivary glands swarming with trypanosomes. In none of the negative experiments was an infection of the salivary glands noted.

The type of trypanosome found in the gut and salivary glands of infective flies is figured in a coloured plate; they are identical with those found in the development of *T. gambiense* in *G. palpalis*.

The conclusions are :—

"1. *T. brucei*, Zululand, 1913, belongs to the same group as *T. gambiense* as regards its cycle of development in the tsetse fly.

"2. It has been shown that the trypanosome causing disease in man in Nyasaland also belongs to the same group.

"3. The cycle of development of the Nyasaland and Zululand trypanosomes in *G. morsitans* is so marvellously alike that it affords another reason for believing in the identity of these two trypanosomes."

W. Y.

Bruce (David), Hamerton (A. E.), Watson (D. P.) & Lady Bruce. **The Trypanosome causing Disease in Man in Nyasaland. Part III. Development in *Glossina morsitans*.**—*Proc. Roy Soc.* 1914. June 4. Vol. B. 87. No. B. 598. pp. 516-525. With 1 coloured plate.

All the laboratory-bred *G. morsitans* used in this experiment were hatched out of pupae obtained from captive flies, a slow and laborious process. The work was therefore rendered difficult by the small number of laboratory-bred flies which could be obtained; moreover flies bred from captive flies are not so strong and healthy as those hatched out from wild pupae.

Eleven experiments were performed with laboratory-bred flies and of these three were positive and eight negative ; five were also carried out with wild flies, as no laboratory-bred flies were available, and all were positive. Details of these experiments are given in two tables. As each fly died it was dissected ; several infected flies were found in the negative experiments which probably means that the flies were only infected and not infective. The number of flies used in each experiment was small owing to the difficulty of obtaining laboratory-bred flies. During the experiment they were kept in the laboratory at 84°F. (29° C.). Two hundred and eighty-seven laboratory-bred flies were used and 25 infected flies were found—8·7 per cent. Two hundred and fifty-five wild flies were used and 23 were found to be infected—9 per cent.

In another table further details of the eight positive experiments are recorded. An average period of 24 days was required to complete the cycle of development of the human trypanosome of Nyasaland in *G. morsitans*, the flies being kept at 84° F.

In the three positive experiments with laboratory-bred flies nine infected flies were found. The following table gives the results of the dissection of these nine flies.

Table V.—Laboratory-bred Flies. Result of the Dissection of the Infected Flies found in the Positive Experiments.

Expt.	Time, days.	Proboscis.	Proventriculus.	Foregut.	Midgut.	Hindgut.	Salivary glands.
1003	33	—			+		—
1003	39	—			+		?
1723	30	—	+ +	+ +	+ +	+ +	—
1723	30	—	+ +	+ +	+ +	+ +	—
1723	48	—	—	—	—	—	—
2405	32				+		—
2405	33	—	+ +	+ +	+ +	+ +	+ +
2405	33	—	—	+	+	+	—
2405	33	—	—	+	+	+	—

Experiment 1723 is of especial interest and is reported here in full :—

"In Experiment 1723, three infected flies were found. The first and second had the alimentary tract swarming with flagellates, but none in the salivary glands. The third was found on dissection to be free from trypanosomes throughout. This is curious because this fly had been isolated in a glass tube as an infective fly, and had, when used alone on a rat and rabbit, infected both these animals. The fly remained alive in the tube for 13 days, and the only explanation that can be given is that in this case the trypanosomes disappeared absolutely from the fly some few days before its death. This was the first time this had been observed to take place, and it was thought to be a remarkable phenomenon and difficult to credit, until another example of the same kind was observed. It must, therefore, be held as probable that an infective fly, with presumably both salivary glands and alimentary tract swarming with trypanosomes, can lose all these flagellates and become non-infective."

In other tables are given the results of dissection of the infected flies found in the positive experiments with wild flies, and also those of the infected flies found in the negative experiments with laboratory-bred flies. In only one of the latter was invasion of the salivary glands by trypanosomes noted ; why this fly did not infect the animal on which it fed it is impossible to state.

The technique employed in the examination of the flies was that already described (see *Sleeping Sickness Bulletin* Vol. 3, p. 241). The method of isolating infective flies and inducing them to salivate on a clean cover-slip was also made use of (see this *Bulletin* Vol. 2, p. 584).

The authors then describe the morphological characters of the trypanosomes found in the alimentary tract and in the salivary glands of infective flies. The developmental changes which take place are similar to those already described in the development of *T. gambiense* in *G. palpalis*. The authors write :—

" It is still a matter of speculation as to how they (the trypanosomes) gain access to the glands, but as described in a former paper there is no doubt that they are often thrown forward in to the proboscis during or just in the act of feeding, and may, under these conditions, be drawn into the hypopharynx and so reach their destination. These proventricular forms, however, have never been actually seen by the Commission in the hypopharynx."

The forms encountered in the gut and salivary glands are depicted in a coloured plate.

The conclusions are :—

" 1. The trypanosome causing disease in man in Nyasaland belongs to the same group as *T. gambiense*, the development taking place in the alimentary tract and salivary glands, not in the proboscis, of the fly.

" 2. The percentage of flies which become *infected* is the same as in *T. gambiense*, 8 per cent.

" 3. The percentage of flies which become *infective* is about 1 per cent.

" 4. The length of time which elapses before a fly becomes infective varies from 14 to 31 days, average 23 days.

" 5. The infective type of trypanosome in the salivary glands—corresponding to the final stage of the cycle of development—is similar to the short and stumpy form found in the blood of the vertebrate host."

[This paper confirms and extends the work of Kinghorn, Yorke and Lloyd, see this *Bulletin* Vol. 1, p. 268.]

Yorke (Warrington) & Blacklock (B.). **The Identity of *T. rhodesiense* with the Trypanosome of the same Appearance found in Game.**—*Brit. Med. Jl.* 1914. June 6. pp. 1234-1236.

In this paper, called forth by that of Kleine, summarised in this *Bulletin*, Vol. 3, p. 415, the authors traverse ground familiar to students of this subject. They give the following summary :—

" In favour, then, of game being the reservoir of human trypanosomiasis in South Central Africa we have the following facts :—

" 1. Human beings and game are known to be infected with trypanosomes identical as regards morphology, pathogenicity in laboratory animals, and their development in *G. morsitans*.

" 2. The human trypanosome can be successfully inoculated into game.

" 3. The peculiar sporadic occurrence of the disease in human beings suggests that they were infected from a widely spread reservoir of the infection (the game) rather than from one another.

" In conclusion, we submit that the hypothesis that man enjoys marked natural immunity and is in consequence to a great extent resistant to infection with this parasite affords a satisfactory explanation of the distribution of the disease, of its comparative rarity, and of the fact that Taute's attempt to infect himself failed."

The arguments of Kleine are examined. He does not accept the assumption that the majority of human beings are resistant or only occasionally susceptible to *T. rhodesiense*, on the ground that if animals become infected with what is for them usually a non-infective trypanosome the infection invariably dies out quickly. Yorke and Blacklock rejoin that they have succeeded in breaking down the immunity of rabbits to infection with *T. vivax*, some dying of an acute infection

in from 5 to 20 days. [It should be noted, however, that the first attempts to infect rabbits failed entirely or " resulted in a temporary infection in which the parasites were exceedingly scarce and disappeared after a few days." It was only after the 38th goat passage that a fatal infection was produced. Can rabbits be infected with *T. vivax* by tsetse bites ?] The authors rightly point out that in the case of human inoculation put on record by Todd, the trypanosome was more likely than not other than nagana. With regard to the natural resistance of man they point out that man exhibits a marked degree of resistance to infection with the genus Trypanosoma as a whole.

A. G. B.

Kleine (F. K.), Fischer (W.) & Eckard (B.). **Ueber die Bedeutung der Speicheldrüseninfektion bei der Schlafkrankheitsfliege** (*Glossina palpalis*). **(II. Mitteilung.)** [The Significance of Infection of the Salivary Glands in Sleeping Sickness Tsetse Flies.]—*Zeitschr. f. Hyg. u. Infektionskr.* 1914. May 27. Vol. 77. No. 3. pp. 495-500.

In a previous communication (see this *Bulletin*, Vol. 2, p. 32), the authors showed that in *G. palpalis* infective with *T. gambiense* only the salivary gland parasites were capable of infecting when injected into susceptible animals and that inoculation of the gut contents, swarming with trypanosomes, did not cause infection. In this paper the authors consider the track by which the salivary glands become invaded. They considered that the most probable path was not *via* the proboscis but directly through the body cavity. If this were really the case trypanosomes should be demonstrable in the fluid of the body cavity, especially in those Glossina which are either just about to become infective or have just become so.

Laboratory-bred *G. palpalis* were fed four times on monkeys infected with *T. gambiense* and *T. rhodesiense* and subsequently on a healthy monkey until it became infected. When at least one infective fly was known to exist in a small batch all were killed with chloroform and examined. In order to obtain fluid from the body cavity a transverse slit was made on the ventral surface of the abdomen by means of fine scissors and from this a small longitudinal slit was directed upwards. Danger of injury to the intestine does not exist in the case of non-pregnant females as a considerable quantity of fat lies between the abdominal wall and the gut ; it is advisable, however, not to make the examination less than 24 hours after the last feed. The fluid oozing out of the wound is taken up in a capillary tube and spread on a slide and fixed and stained. In the majority of cases, particularly in male Glossina, the abdominal wall was not opened with scissors but the legs were cut off quite close to the thorax. On gentle pressure fluid from the thoracic and abdominal cavities exuded from the wound. This method proved most satisfactory some hours after the last feed.

In all 215 flies were fed on infected monkeys and at least 21 were proved to be infective. In none of these were trypanosomes found in the fluid of the body cavity. In addition 207 flies were examined which, for more than 24 days, had been fed first on infected and then on healthy monkeys. It was not determined whether these had actually become infective, but 11 exhibited numerous trypanosomes in the intestine which showed that these were at least on the way to becoming

infective. In no instance was the body cavity fluid found to contain trypanosomes.

Before this systematic investigation was undertaken the authors had examined nine infected Glossina and had found trypanosomes twice in the body fluid by the abdominal incision method and once by the method of removal of the legs. They now consider that this was the result of faulty technique because mammalian blood cells can be seen in the legs of very feeble young flies which have been fed ; such Glossina as these soon die.

The authors therefore agree with Miss ROBERTSON (see this *Bulletin*, Vol. 1, p. 267) that the trypanosomes invade the salivary glands from the gut by way of the proboscis.* The observation that only the trypanosomes in the salivary glands and not those in the gut are infective when injected into susceptible animals is in direct opposition to that of KINGHORN, YORKE and LLOYD (see this *Bulletin*, Vol. 1, p. 268). These authors found that the intestinal contents of infective flies were virulent in each case. The explanation of these different results is not clear ; injury to the salivary glands during removal might cause fouling of the intestines with infective trypanosomes. [The work of ECKARD on *T. rhodesiense* and *G. palpalis* confirmed the observation of KINGHORN, YORKE and LLOYD that the gut contents were infective (see this *Bulletin*, Vol. 3, p. 26).]

The authors have modified their opinion that a larger proportion of infective flies are obtained by feeding on monkeys than on goats or sheep ; it is immaterial what kind of mammalian blood is used for feeding the flies. Apart from climatic conditions are other unknown factors which may influence the point in question. In many places

---

*PATTON and CRAGG lay stress on the anatomical objections to this route. They write :—

" In the first place, the salivary apparatus of *Glossina* as of *all* Diptera, is entirely separate from the alimentary canal, the only point in common between the two being that they open at the prestomum, that is, at the extreme tip of the proboscis. Although the food channel in the proboscis and the salivary duct in the hypopharynx are in close apposition, they are quite distinct channels, and communication between the two is *only* established at their openings, if at all. It is clearly necessary, therefore, that the trypanosomes, if they do not penetrate the wall of the gut and make their way to the salivary glands from the outside, must pass up the food channel to the tip of the proboscis and then turn round the corner and make their way back in the reverse direction up the hypopharynx. In other words, they pass through the valvular proventriculus, up the empty and contracted oesophagus, through the pharynx and the connected sphincter muscles, which are specially designed to prevent the forward passage of the contents of the gut, and down the narrow channel between the labrum-epipharynx and the hypopharynx ; they then turn directly backwards, past the valve formed by the patulous tip of the hypopharynx, up the salivary duct and through the salivary valve, designed to permit of only a forward flow of the saliva, and into the glands. Further, during all this time they must necessarily travel in the reverse direction to the normal flow of the contents ; if a feed of blood is taken while they are passing forwards they will have to maintain their position against a relatively enormous mass of blood, quickly absorbed. If they have reached the salivary duct they will have to maintain their position against the flow of saliva."

[Patton (Walter Scott) & Cragg (Francis William). A Textbook of Medical Entomology. 1913. London, Madras and Calcutta : Christian Literature Society for India, pp. 737–738.]

sleeping sickness does not advance in spite of favourable climatic conditions whilst there is the experimental evidence that it is very difficult or even impossible to infect Glossina with certain trypanosome strains.

From other experiments it appears that strains of *T. gambiense* which have recently passed through Glossina were especially suitable for infecting new Glossina, whilst on the contrary those strains which have existed for a considerable time in the vertebrate host no longer possess the power of infecting Glossina in the same degree. Reference is made to the work of Bouet and Roubaud who found that strains of *T. gambiense* and *T. brucei* taken by them from the Pasteur Institute to Dahomey were no longer capable of infecting Glossina (see *Sleeping Sickness Bulletin*, Vol. 2, pp. 351–353). Recently Roubaud found that the Zululand strain of nagana was incapable of infecting Glossina (see this *Bulletin*, Vol. 2, p. 245). This strain is monomorphic and has in the authors' opinion lost its short aflagellar forms during the course of the years it has been kept in the vertebrate host. The work of Miss Robertson showing that it is these short forms which cause infection in Glossina is of especial interest (see this *Bulletin*, Vol. 1, p. 502).

W. Y.

Quantz. **Ueber die ersten klinischen Symptome der Trypanosomiasis.** [The First Clinical Symptoms in Trypanosomiasis.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. May. Vol. 18. No. 10. pp. 340-344.

Reference is made to Eckard's paper on this subject (see this *Bulletin* Vol. 2, p. 346). This author holds that the onset of sleeping sickness is acute. Quantz then quotes a number of writers who state on the contrary that the onset is gradual. Fever, according to these authors, is an important symptom; it is, however, not prominent as one of the earliest symptoms of the disease, but in association with glandular swellings attacks of fever occur.

Definite knowledge of the commencement of sleeping sickness was first obtained by examination of a number of European patients. A series of such cases which have come under observation recently show that the beginning is not unnoticed and gradual but is marked by violent fever. The clinical histories are given of the first symptoms of the disease in 8 cases under observation at the Seamen's Hospital, Hamburg. In 5 of these there was a history of unmistakably acute onset, in one case the statements of the patient were very unreliable and in the other two the onset was complicated by malaria.

These observations therefore confirm those of Eckard that the onset of sleeping sickness is acute with high fever.

W. Y.

Vorwerk. **Versuche mit Salvarsan bei Schlafkrankheit.** [Salvarsan in the Treatment of Sleeping Sickness.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. May. Vol. 18. No. 10. pp. 329–335.

This paper is a record of 12 cases of sleeping sickness from the Tanganyika district of German East Africa which were treated with salvarsan. The patients were with two exceptions in the second stage

of the disease—glandular swellings but general condition good—one case was emaciated and weak and the other exhibited nervous symptoms. All the cases were previously untreated. The drug was given intravenously in doses of ·4 gm. Each injection was, with a few exceptions, followed by a febrile reaction, which occurred 1–2 hours after treatment. There was also some headache and feeling of lassitude. Generally the reaction following the second injection was more marked than that following the first. In two cases the pulse was quickened up to 140–148 and in another there was vomiting, headache, diarrhoea and fever lasting 48 hours. The author gives details of two other cases in which there was collapse—death occurring in one of them—48 hours after a second injection of the drug.

The action of salvarsan on the trypanosomes was always immediate; the parasites had disappeared from the cervical glands in 45 minutes in some cases. In other instances the glands were punctured with negative results at intervals varying from 2–7 hours after injection. The trypanosomes disappeared from the peripheral blood quickly and completely.

The following summary of the results obtained is given :—

1. A single intravenous injection of salvarsan caused immediate disappearance of the trypanosomes from the glands and blood in cases of Tanganyika sleeping sickness in the second stage. [The author means by this patients in good condition with enlargement of the lymphatic glands.]

2. After a single, or repeated doses, in almost all cases relapses occur within periods varying from ½ to 6 months.

3. In patients of the third stage, that is those in poor condition or exhibiting nervous symptoms, salvarsan is contra-indicated as dangerous to life.

4. In respect of permanent sterilisation salvarsan is of less value than atoxyl, as after the employment of the latter in cases occurring in Tanganyika lengthy relapse-free periods are not seldom observed.

W. Y.

Lurz (R.). **Heilungsversuche mit Salvarsan bei Schlafkrankheit.** [Treatment of Sleeping Sickness by Salvarsan.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. May. Vol. 18. No. 10. pp. 335-339.

An account is given of the result of treating 16 cases of sleeping sickness in German East Africa with salvarsan. As the patients were mostly in poor condition ·3 gm. of salvarsan was given by preference and the dose repeated after 1–4 days. On certain occasions, however, ·4 and ·5 gm. was administered. The patients tolerated the drug differently; one case had 7 and another 5 injections without any symptoms, whilst in others there was occasionally a rise of temperature. Toxic symptoms were noticed on 6 occasions out of the 70 intravenous injections given. Immediately after administration, or after the lapse of 2 or 3 hours, rigors with a rise of temperature to 39–40·1° C. were noticed. These were accompanied by pains in the head, chest and abdomen, vomiting and in one case pain in the legs. After 5–6 hours the symptoms began to subside and in a day or two the patient had fully recovered.

At least once a week the blood was examined by the thick film method and also the cerebrospinal fluid of those in whom trypanosomes were found in the blood or of those who appeared worse. De-

tails of the number of injections and amount of the drug administered to each patient are given. In all instances the swelling of the glands diminished and the trypanosomes disappeared from them. The length of time which the patients have been under observation varied from $3\frac{2}{3}$–$5\frac{1}{3}$ months.

Of the 16 cases one, in which trypanosomes were found in the cerebrospinal fluid, died. In 6 the trypanosomes reappeared in the blood but the general condition remained unchanged. One case became much worse without the reappearance of trypanosomes in the blood or in the cerebrospinal fluid. The remaining 8 cases were benefited and trypanosomes had not reappeared. In 4 cases trypanosomes always reappeared in spite of frequent injections of salvarsan. It seemed impossible to cure them with salvarsan. The two other cases which relapsed might possibly after more than 3 or 4 injections of the drug have been permanently sterilised. All 6 were subsequently treated with atoxyl and in only one did trypanosomes not disappear from the blood. Whether those in whom there had been, up to the time of writing, no relapse are permanently cured it is yet too soon to state.

No advantage was noticed by using salvarsan and mercury treatment in combination.

Repeated injections of salvarsan are useful in the treatment of sleeping sickness since such treatment sometimes causes the trypanosomes to disappear from the blood and the general condition of the patient is improved. Salvarsan can be employed with advantage in those cases of sleeping sickness which are complicated by syphilis or framboesia.

W. Y.

Mesnil (F.) & Roubaud (E.). **Sur la Prophylaxie des Trypanosomiases.** *Compt. Rend. xv Congrès International d'Hyg. et de Démographie.* Washington. Sept. 23-28. 1912.

In this paper the authors summarise the various measures which can be employed with the object of stamping out sleeping sickness and animal trypanosomiasis. They first discuss the suppression of the reservoir of the virus, and deal with such points as the isolation and segregation of infected human beings and the sterilisation of the peripheral blood of such persons by means of treatment. Referring to the game reservoir the authors consider that, except perhaps in Rhodesia and Nyasaland, little is to be hoped from the destruction of game.

In the next section they deal with the campaign against the Glossina; they point out that this varies to a certain extent according to whether the tsetse responsible happens to be hygrophil such as *G. palpalis* or xerophil as is *G. morsitans* or intermediate between these two *G. longipalpis*. Writing on *G. morsitans* transmitted trypanosomiasis the authors write that 'destruction of the game ought to be recommended everywhere where animal trypanosomiasis is spread by these tsetses'.

The campaign against other insect carriers is next discussed. A large number of trypanosomes are not transmitted by tsetses. Stomoxys, Tabanidae, Stegomyia and Mansonia are all supposed to

play a part in the dissemination of trypanosomiasis. The various ways of attacking these flies are discussed.

Selection of resistant races. Animals which have recovered from trypanosomiasis acquire a resistance against re-infection. This fact is brought out in nature for it has long been established that indigenous races are more resistant to trypanosomiasis than are those imported. This applies especially in the case of ruminants (cattle, goats and sheep) and certain races are remarkable for their particular resistance. Unfortunately it does not hold in the case of the *equidae.*

The prophylactic measures which can be adopted to prevent the spread of dourine are next discussed and finally the authors consider the question of the protection of clean areas against infection.

W. Y.

Todd (John L.). **The Prevention of Human Trypanosomiasis in Africa.**—*Trans. xv. Internat. Congress on Hygiene and Demography.* Washington. Sept. 23-28. 1912.

This paper is a review of the measures which may be recommended with a view to limiting the spread of sleeping sickness. The author emphasises the importance of such means of attacking *G. palpalis*, and other flies responsible for the spread of sleeping sickness, as clearing the bush and screening of houses, trains and steamers, and the wearing of suitable clothing. As it is impossible altogether to prevent people being bitten by tsetse flies in districts where they exist, and as there is no method of exterminating the flies, the importance of preventing the entrance of trypanosomes contained in the blood of infected persons or animals into uninfected regions is evident. The disease is most virulent amongst populations newly subjected to it and the extension of sleeping sickness seems to be largely due to the increased movement of human beings about Africa resulting from increased trade. The recognition of cases of human infection is difficult. The author once more lays stress on the importance of enlargement of the lymphatic glands as a diagnostic sign. The value of segregation and treatment of infected persons is discussed. Referring to the other vertebrate carriers of the virus the author writes :—

" Many wild animals and all domestic ones can be infected with the human trypanosome. It will therefore probably be wise to destroy all wild animals near settlements, to make certain that domestic animals are uninfected and, by protecting them from fly bites, to prevent their infection."

Todd then indicates various lines along which he considers research might with advantage be directed. " Work on the nature of the relative active immunity which sometimes exists in animals and men and on the questions connected with immunity should be fruitful." Further knowledge is required on the bionomics of trypanosomes and what animals—mammals, reptiles, birds, or insects—can harbour them. More precise information regarding the development of the trypanosomes in the tsetse fly, and of the other insects in which development may occur, is urgently required.

With reference to the bionomics of Glossina the author writes :—

" Very little is known of any of the tsetse flies. Knowledge concerning the following points in particular is much needed for all of them : their

distribution, especially why tsetses, though occurring in the neighbourhood, are sometimes very persistently absent from localities apparently suited to them; their migrations and the influences determining their local increase and decrease in numbers; their seasonal variations; their natural enemies, both rapacious and parasitic; their food; the whole story of their reproduction in nature; the possibility of using traps for the destruction of adult flies."

In conclusion Todd points out that "wherever it is possible permanent methods of prevention such as deforestation and education of the natives should be employed in preference to temporary ones such as the depopulation of a district."

W. Y.

PRINCIPE. **Report of Sleeping Sickness Commission in Principe, October and November, 1913.**—Published as a Supplement to the "Gazette" of San Thomé and Principe on Mar. 2nd, 1914. [Translation forwarded to Foreign Office by Consul General HALL HALL.]

The authors* refer to the Report published last year (summarised in this *Bulletin*, Vol. 2, p. 574). The prophylactic measures now proposed include the following:—

(1) The isolation of all persons attacked on a fly-free part of Principe for some of the infected, and in the neighbouring island of Bom Bom for the rest; all expenses to be paid by the plantation owners. (2) The employment of sanitary brigades on their own special work, and no other. (3) The slaughter of animals as soon as the disease is detected. (4) The giving of 0·6 gm. atoxyl by injection to all serviçaes who are bitten, to be repeated 48 hours later. (5) All tsetse flies caught to be sent to the city with a note of the place where taken.

It was hoped that all the serviçaes attacked would have been isolated at the end of January 1914.

As evidence of the great diminution in the numbers of *Glossina palpalis* the following facts are given: In Sundi plantation when the Commission began its work 9,000 to 10,000 flies were caught every month; in October 1913 the number caught was 938, and in November, 380. On the Porto Real plantation there was formerly a monthly catch of 6,000 to 7,000 flies; in October only 314 were caught and these on neighbouring property belonging to natives. In October 1912, 15,973 Glossina were caught in the island by the glue system, whereas in October, 1913, though the work was better organised, the catch was only 2,311. It is noted that land planted with cocoa trees is ill-suited for Glossina and that more than half the island is so planted.

In October and November, of 493 persons examined only five showed for the first time the presence of trypanosomes. Thick film preparations were formerly used; now centrifugal treatment of the blood, lumbar puncture, and experimental inoculation are employed when possible. In the two months 197 animals were examined; trypanosomes were found in five, three of which had been recently imported. In May, 1912, of 206 animals examined 40 were found infected. This is an index of the improved conditions.

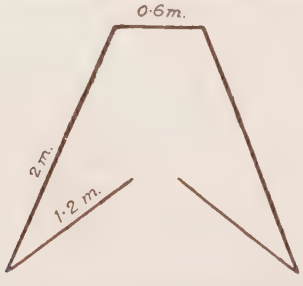
A. G. B.

* The Medical Mission consisted of Drs. BRUTO DA COSTA, J. F. SANTANA, A. CORREIA DOS SANTOS and GOMES DE ARAUJO ALVARES.

Zupitza (M.). **Versuche und Vorschläge zur Verbesserung von Glossinenfangmethoden.** [Experiments and Proposals for the Improvement of Methods of Catching Tsetse Flies.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. June. Vol. 18. No. 11. pp. 363-375. With 2 figs.

The author refers to the experiments of Cleve with tsetse lime and the work done with this substance by Koch and Vorwerk. The flies, he thinks, are led to their victim by the senses of sight and smell, but the limed cloths tend to prevent the scent of man or animal reaching them. He has therefore proposed and carried out a modification of Maldonado's method, using a supporting substance having meshes which do not interfere with the scent. A sheet of metal gauze is worn by the fly-catcher suspended by straps from the shoulders, the back and front being thus covered; the gauze can be removed by the wearer so that he can pick off the trapped flies without assistance. The lime used came from Germany and smelt of resin. It has the appearance and consistence of honey and becomes fluid in the hot time of the day, so that it has to be renewed every two hours. It is insoluble in pure water. This apparatus was tried alongside the ordinary butterfly net, as is shown in a table. Adding together the catches of five days, 113 were caught by the net and 106 by the lime trap, or 100 to 94. The author notes that any tsetse flies which once came into contact with the lime would not escape destruction even if they did not remain on the trap, as the viscid substance would hamper their movements. He suggests wire made of iron with a mesh of about one centimeter; the simplest form would be that of a cylinder flattened before and behind, or a sort of shirt of mail.

He describes also a trap for use without lime. This consists of a cage two meters high having a wooden frame covered with metallic wire, the horizontal section resembling the head of an arrow with the tip cut off. The fly-catcher is inside. The wall opposite the tip consists of two portions like folding-doors projecting inwards, with a



slit between. If the flies come against any part of the wall, they buzz round and eventually pass through the slit and are easily caught or killed. The slit is not closed in any way. He suggests that the framework might be covered with thick muslin, which is easy to pack and carry. A table shows the results obtained with the wire apparatus. These are inferior to the butterfly net catches, but not greatly so. The apparatus has the disadvantage that it must be stationary, but this is useful in certain conditions. An animal may form the bait. [Such an apparatus would rarely serve its purpose as well as an expert and mobile fly-catcher.] A. G. B.

Newstead (Robert) & Davey (J. B.). **Royal Society's Commission on Trypanosomiasis in Nyasaland, British Central Africa. First Preliminary Report on the Bionomics of *Glossina morsitans*.**—*Reports of the Sleeping Sickness Commission of the Royal Society.* 1914. No. 15. pp. 142–157. With 3 plates.

Professor Newstead left England on June 9th, 1911, and was absent for five months. His observations in Nyasaland, where he was joined by Dr. Davey, cover the period from July 18th to November 2nd. They were made in a district four miles south of Lake Malonge and near the Shire river. The physical features of the country are described; it consists of a broad alluvial plain. The dry season commences in May and lasts till the end of September. An interesting account is given of the vegetation of the river and its borders, the 'dambo,' and the forest or fly area. The forest is described as 'low forest'; the preponderating tree is the sanya (*Copaifera mopane* Kirk), the leaves of which are eaten by the mpala antelope. It is stated that the sanya tree, mpala antelope and *Glossina morsitans* are apparently correlative, that is to say, all are found together, but it is noted that elsewhere in Nyasaland *morsitans* occurs in the absence of sanya trees. Next comes an account of the vertebrate fauna of this district. Guinea-fowls are extremely numerous. Two were procured and tied up where tsetse were very common. The fly made no attempt to attack them. It was found that persons wearing khaki clothing were more attractive to tsetse flies than others. From counts made in which the ratio of the sexes was noted it was concluded that an increase in the number of females was due to very heavy rains. A few pupae were found, and it is considered that in this region breeding grounds are thinly scattered. A table gives the result of breeding experiments. It is noted that in this species of Glossina the wings do not completely overlap when the flies are at rest. Remains of tsetse flies were found in the common black drongo and in a small black and yellow throated bee-eater.

A. G. B.

Graham (L. W.) & Hutchison (R. H.). **The Influence of Experimental Trypanosomiasis upon the Body Temperature of White Rats.**—*Amer. Jl. Trop. Diseases & Prevent. Med.* 1914. May. Vol. 1. No. 11. pp. 760-775. With 3 plates.

The normal ranges of temperature in healthy white rats was first determined. The thermo-electric method for temperature measurement was employed. This method depends on the fact that when a circuit is made of two metals a current of electricity is generated if the junctions are of different temperatures. The strength of the current varies with the difference in temperature and with the metals employed. A detailed description of the technique is given. Readings of body temperatures were made at short intervals over a considerable period of time. The animals were subjected to different external conditions, viz. room temperature, a temperature of 37° C. and refrigerator temperature. After determining the fluctuation of temperature in healthy rats under these external conditions, similar readings were again made after infection of the same animals. In the first experi-

ment, a series of readings was made every 15 minutes for a period of 24 hours before and after infection ; in the second and third experiments readings were made every 10 minutes for 12 hours before inoculation and for as long after infection as the animal lived. The problem of keeping the couples in place in the lower intestine was of first importance. At first it was thought necessary to curtail the movements of the animals as much as possible, and with this object in view, the rats were kept in wire cones specially constructed to prevent their doubling up inside. Such restraint was found satisfactory for rats kept at room temperature and at 37° C., but in those cases where the animals were kept in the refrigerator the influence of the wire cone holder in preventing temperature regulation by its restraint upon muscular movement introduced an abnormal factor. This objection was obviated in the second and third experiments by placing the rats in separate cages. The wires were especially strengthened and the rats gagged.

The trypanosomes employed were for the most part pathogenic (*T. evansi*, *T. equinum* and *T. brucei*), but in the first experiment *T. lewisi* was used.

The following are the conclusions :—

" 1. In white rats experimental trypanosomiasis causes no rise in body temperature.

" 2. Pathogenic trypanosomes of high pathogenicity seem to decrease the power of thermal regulation in white rats under the influence of prolonged cold ; but the non-pathogenic form, *T. lewisi*, does not show this effect.

" 3. In white rats at ordinary temperature and under the influence of prolonged heat, none of the trypanosomes used in these experiments had any effect upon thermal regulation.

" 4. From observations made upon the blood of infected rats it seems that conditions of prolonged heat and cold may possibly decrease the virulence of pathogenic trypanosomes without diminishing their pathogenicity."

W. Y.

Terry (B. T.). i. **The Influence of Heat upon the Toxicity for Trypanosomes of Blood containing Transformed Atoxyl.**—*Jl. of. Pharmacology & Experim. Therapeutics.* 1913. Mar. Vol. 4. No. 4. p. 361.

ii. **Variations in the Toxic Effect of Transformed Atoxyl on Trypanosomes in vitro Caused by Altering the Number of the Organisms.** —*Ibid.* pp. 361-362.

i. If a solution of atoxyl in blood be incubated at 37° C. for 2 or 3 hours a substance (transformed atoxyl), which is toxic for trypanosomes, is formed. This disappears to a large extent on heating to 70° C. whilst, if the solution be then heated to 100° C., it is found to be almost as toxic as if it had not been subjected to any heat at all.

The author writes " The evidence at hand indicates that heating to 70° C. for a short time causes the toxic substance to be taken up by the red blood corpuscles, while heating to 100° C. liberates it more or less completely. The liberation of the toxic substance is more complete after half an hour at 100° C. than after ten minutes."

ii. Experiment showed that the influence of the toxic substance (transformed atoxyl) upon trypanosomes varied inversely with the number of organisms present. From this observation the author concludes " (1) that the trypanosomes in suspension should be comparatively few if slight degrees of toxicity are to be detected and (2) that a standard number of trypanosomes should be employed if great accuracy in comparing results obtained with different suspensions is desired."

W. Y.

MALARIA.

DARLING (Samuel T.). **Studies in Relation to Malaria.**—Isthmian Canal Commission Laboratory of the Board of Health, Department of Sanitation. Second Edition. 42 pp.

The paper comprises a full account of malaria in the Canal Zone. The matter is divided under several headings.

1. *The Anophelines of the Canal Zone.*—These are *Anopheles argyrotarsis, A. tarsimaculata, A. gorgasi, A. albimanus, A. cruzii, A. apimaculata, A. punctimaculata, A. malefactor, A. eiseni, A. franciscanus, A. pseudopunctipennis.*

The commonest species are *A. albimanus, A. pseudopunctipennis,* and *A. malefactor.* Only one specimen of *A. gorgasi* has been taken. Naturally the predominance of a species varies from season to season and from place to place. In certain villages *A. albimanus* only will be found and at Ancon in 1908, 27 per cent. of the anophelines were *A. malefactor,* 72 per cent. *A. albimanus. A. eiseni* and *cruzii* are tree-living species; it would have been of considerable interest to determine the efficiency of these latter as regards malaria, but it was almost impossible to obtain larvae, and amongst the hundreds of insects caught within quarters and barracks no adult specimens were ever seen. It is, therefore, extremely unlikely that they play any part whatever in the transmission of malaria in the Canal Zone.

2. *Collection of larvae.*—Larvae were forwarded daily to the laboratory by the sanitary inspectors, and subsequently were transferred to glass moist jars partly filled with fresh water, care being taken to remove predaceous larvae, such as those of the dragon fly. The mosquito larvae were further transferred to feeding tanks containing algae and organic debris. It was found essential to keep the water in the breeding tanks fresh and free from fouling by injecting a jet of air through it by means of a Pacquelin cautery bulb provided with a heavy glass perforated tip; the temperature of the water in these tanks ranged between 72°–84° F.

3. *Breeding out. Methods of feeding.*—Pupae were separated in the morning and evening and placed in breeding-out tubes half filled with water and plugged with cotton, the newly emerged mosquitoes being subsequently transferred to biting jars. The best kind of jar for this purpose was a lantern chimney covered at both ends with crinoline gauze, fastened with adhesive plaster and a strong rubber band. Inside the jar was placed a circular ring platform of stiff paper as a resting place for the mosquitoes. About 20 mosquitoes were placed in such a jar over a small dish containing water and a raisin or date for food. The jar would then be placed on a shelf in a dimly lighted place protected from ants by kerosene cups. It was found that Anophelines thrive much better if given one or two preliminary blood meals before being fed with dates and raisins. In several experiments it appeared that yeasts and bacteria flourished to such an extent in the midgut of banana-fed mosquitoes as to prevent the development of zygotes in susceptible insects. In one experiment a patient, whose blood contained almost as many crescents as leucocytes, was bitten by four species of mosquito, three of these being

susceptible species, yet none became infected. This failure is attributed to the banana diet. Raisins and dates should always be used for keeping mosquitoes alive.

4. *Biting and infecting experiments.*—It was found most convenient to conduct the feeding experiments at 4 p.m., and on these occasions it was generally necessary to cover the jars well with a thick towel. Female mosquitoes several days old which had been fed exclusively on dates and raisins would generally bite greedily and would feed on successive or alternate nights if given an opportunity. Various devices for inducing the mosquitoes to bite proved serviceable. Tapping the jar and pointing it at a light at the end of the room serves to dislodge the mosquitoes and induces them to congregate on the gauze at the illuminated end, the patient's arm can then be carefully interposed and placed on the gauze, when the mosquitoes generally commence to feed.

The jar is then removed to a laboratory, one of the gauze covers is removed and replaced by a card which is slipped out when the jar is placed in a Petri dish cover containing water and raisins; under these conditions Anophelines may be kept alive for two or three weeks.

At the time of biting the patient, two or three good blood films were taken and differential counts made and the proportion of gametes to leucocytes estimated; by these means it was possible to estimate the number of gametes ingested by the mosquito in feeding.

5. *Estimation of gametes.*—The estimation of the number of gametes per cubic mm. of patient's blood, which is approximately the amount ingested, gives an idea as to the grade of infection to be encountered in any particular insect. The amount of blood ingested by each individual mosquito, as estimated by weighing the insects before and after feeding, was found to be approximately ·0008 gramme.

Assuming the specific gravity of the blood in malarial fever with slight anaemia to be 1·050, then 105 : 100 : : ·0008 : ·000762=volume of ·0008 gramme of blood. Now if there were 22 gametes per 100 leucocytes and 6,500 leucocytes per 1 cmm., there would be 22 by 65 by ·761 1,088 gametes ingested. If under the most favourable circumstances there are an equal number of male and female gametes there should have been after three feedings 1,632 zygotes in the mosquito's midgut. As a matter of fact there were only 50, showing a loss of about 97 per cent.

This may be partly explained by the observation that *in vitro* 50 per cent. of gametes are taken up by polymorphonuclear leucocytes.

6. *Care of mosquitoes after feeding.*—The mosquitoes may be fed nightly or every other night with blood, or, if it is desired to ascertain the rate of development of zygotes they are fed on dates after a single feed of blood. The live insects should be preserved in jars and given fresh food and very little water, just enough to favour oviposition and to moisten the air.

Chloroform and cyanide are useful for killing; the latter is preferable as it causes the mosquitoes to spread out their wings and thus renders identification easier.

7. *Method of examining for zygotes and sporozoites.*—Successful dissections can only be obtained with freshly killed specimens. If an

absolute identification of the mosquito cannot be made at the time, all parts excepting the abdomen must be preserved intact and identified later.

8. *Description of the malaria parasites in the mosquito.*—Fifty per cent. or more of the gametes were ingested by polymorphonuclear cells in the mosquito's stomach and thus reduced materially the number of fertilized ookinetes. The earliest forms of the aestivo-autumnal zygote were detected in the gut wall after the expulsion of the blood meal, or after 2½ days.

Measurements of the zygote and oocyst at varying periods of development show that the benign tertian parasite increases from 12 to 16·5μ in diameter on the 4th day to 48μ on the 9th day, after which sporozoites are found in the salivary glands; the subtertian parasite increases from 5μ (on the 2–5 day) to 30μ on the 12th.

The tertian zygote differs from the subtertian firstly in the rapidity of its development and in the finely granular character of the contained pigment.

In the salivary glands sporozoites were found only in the lumen of the duct, their long axis lying parallel to it. Out of several hundred mosquitoes used in the experiments it was found that 70·2 per cent. of *A. albimanus* became infected, 60 per cent. of *A. tarsimaculata* and 12·9 per cent. of *A. punctipennis*. *A. malefactor* was found to be refractory.

It was concluded from these experiments that *A. albimanus* is the chief transmitter of aestivo-autumnal, and of tertian malaria in the Canal Zone. Specimens infected with the tertian parasite became infected eleven and one half days after the first feeding with the subtertian on the eleventh day after.

It would appear that fecundation and development of ova are not necessary for the development of zygotes.

9. *Limits of infectiousness of man. The zygote carrier.*—In order that a recommendation might be made for the more complete treatment of patients who were discharged from hospital after their temperature had become normal and when their peripheral blood contained more than a sufficient number of gametes to infect susceptible mosquitoes, it was determined to fix the limits of infectiousness of such individuals.

The limit determined was about one gamete per every 500 leucocytes or 12 gametes per 1 cmm.

Darling concludes that the small amount of quinine circulating in the patient's blood from a prophylactic dose of 30 grains a day inhibits to a certain degree the growth of the zygote in the mosquito.

10. *Notes on the bionomics of some of the Anophelines studied.*—The incubation period of ova of *A. albimanus*, *A. pseudopunctipennis* and *A. malefactor* was estimated at thirty-six hours under laboratory conditions, the temperature of the air and water ranging between 78° and 82° F. daily. The eggs when first laid are quite white, becoming black in a few hours.

The larval period varies with the species, food, efficient temperature, sunlight and environment. *A. albimanus* larvae pupated within twelve days, while *A. malefactor* required sixteen to twenty days.

A. albimanus is well fitted for the purpose of transmitting malaria in the Canal Zone; it is the commonest and hardiest species, breeding

in a variety of locations, such as pools, margins of streams and collections of rain water. In the dry season it may be found in the stinking water of sewage streams, brackish marshes, meadows, muddy pools, crab holes etc.

11. *Identification of larvae.*—The chief differentiating characters of the larvae of the common Anopheles of the region are given.

It is then stated that a blood meal seems to be essential for the development of the ova of Anophelines, as in vegetable-fed insects no development of the ovaries appears to take place. In general the effect of an irritating toxin or otherwise noxious fluid on mosquito larvae is to hasten their pupation. None of these larvae will develop in salt but do so rapidly in brackish water.

12. *Experiments with larvicides.*—A number of experiments were carried out for the purpose of finding a cheap and efficient preparation. Crude petroleum was frequently found to be too viscid to have a spreading power of high efficiency, but when mixed with crude carbolic acid this power was much increased.

Anopheline larvae were found to be slightly more resistant than those of Culex.

Copper sulphate is inimical to larvae in a dilution of 1 in 50,000 parts, and to algae in a dilution of 1 in 500,000.

13. *Fumigation experiments with pyrethrum.*—Pyrethrum is burned in iron pots covered at the bottom with a layer of sawdust 2 or 3 inches thick, thus causing complete ignition of the powder. By this method mosquitoes, when exposed to the fumes for two hours, may be killed with quantities of pyrethrum less than one-third of that required by the United States army standard.

14. *Composition and size of mesh of wire screening.*—The two factors of importance in the use of wire screening for protection against mosquitoes are the size of the mesh and the chemical composition of the wire used.

After a number of experiments with live mosquitoes of many kinds a No. 16 wire mesh (16 holes to the inch) was found to be most satisfactory.

Observations over a period of eight years have shown that a wire made of copper, zinc and iron in the following proportions has given the best results and most effectually resists corrosion. Copper 84·83 ; Zinc 14·9 ; Iron ·06 parts.

15. *Effect of quinine on the malaria parasite in man.*—A number of experiments were undertaken in order to estimate the effect of daily doses of quinine on the number of gametocytes in the blood. It was found that with a daily dose of 10 grains of quinine, a gradual but steady decrease in the number of gametocytes and even of crescents took place. With the disappearance of the gametes a contemporaneous decrease in the polymorphonuclear and a rise in the mononuclear elements was noted.

16. *Latent malaria amongst the labourers and their families.*—A blood examination of all Spanish labourers was undertaken in March 1909, during the dry season when very few mosquitoes were breeding. Two per cent. were infected with some form of malaria parasite. It was

surprising to find cases in whose blood no parasites could be found, but who subsequently developed fever.

A complete investigation of all labourers at work and living in screened quarters revealed 9 to 13 per cent. of latent malaria, chiefly of the tertian variety; amongst children and adults living in non-screened or recently screened barracks, the percentage of latent malaria was much higher.

[All workers interested in malaria should not fail to consult this original paper.] P. H. Bahr.

Von Ezdorf (R. H.). i. **Malarial Fevers in the United States.**—*U.S. Public Health Rep.* 1914. Apr. 10. Vol. 29. No. 15. pp. 871-877.

ii. **Malarial Fevers. Prevalence and Geographic Distribution in Alabama.**—*U.S. Public Health Rep.* 1914. May 1. Vol. 29. No. 18. pp. 1073-1083. With 2 maps.

i. This paper embodies rather a superficial survey of the prevalence and distribution of malaria in the United States, and represents a summary of results obtained in Alabama, Arkansas, Mississippi, South Carolina, Georgia, Florida, North Carolina and Tennessee. In the first named State for the three years 1910, 1911, 1912, nearly one-third or 32·7 per cent. of all registered deaths in children were ascribed to malaria.

In the Mississippi area for the last two months of 1913, the deaths registered as due to malaria were 2·3 times greater in number amongst the coloured than amongst the white population.

The months of greatest prevalence are August and September, though the number of fresh infections begins to increase in May.

The tertian parasite appears to be most widely distributed, the quartan is very rare and is only responsible for one-eighth of all infections. Three species of anopheles —*A. quadrimaculatus*, *punctipennis* and *crucians* are widely distributed; to the first named the spread of malaria in the Southern States is attributed.

ii. The regions in the State of Alabama in which malaria prevails to the greatest extent are apparently in the Tennessee Valley belt and the central prairie region. The disease is most prevalent durings the hot summer months, May to August. The tertian parasite accounts for the majority of all infections. Deaths from malaria were only reported from eight of the sixty-seven counties in the State. The number in children reaches 28 per cent. of the total malaria death rate.

[It is to be regretted that these papers on malaria are of little scientific value, as the same facts are recapitulated in several papers in a slightly different form. (See this *Bulletin*, Vol. 1, p. 488, Vol. 2, p. 7, and Vol. 3, p. 256). The method of investigation by means of enquiry from private physicians appears to be inadequate and tends to the formation of conclusions on data which are obviously incomplete.]

P. H. B.

i. Von Ezdorf (R. H.). **Investigation of Malaria in the United States by the United States Public Health Service.**—*Southern Med. Jl.* 1914. May 1. Vol. 7. No. 5. pp. 349-350.

ii. Shoulders (H. H.). **Malaria as a Public Health Problem.**—*Ibid.* pp. 351-353.

iii. Bass (C. C.). **Treatment and Cure of Malaria.**—*Ibid.* pp. 353-357.

iv. Booth (B. H.). **Malaria during the First Three Months of Life.**—*Ibid.* pp. 357–358.

v. Deaderick (William H.). **Some Factors in the Prevention of Malaria.**—*Ibid.* pp. 367-369.

vi. Carter (H. R.). **Quinine-fast Malarial Parasites: a Memorandum.**—*Ibid.* pp. 369–570.

A series of papers of a general nature dealing with various aspects of malaria. No new theories are broached nor are any original observations recorded.

i. Von Ezdorf recapitulates the familiar methods adopted in the prevention of malaria.

ii. This paper consists of an exhortation to the municipal bodies of the Southern States to commence a vigorous anti-malarial campaign.

iii. A well written paper by Bass advocating the rational administration of quinine. No mention is made of the intramuscular method.

iv. Booth appears to favour the "hypodermatic" administration of quinine in the treatment of infants.

v. In this paper Deaderick once more urges the obvious truth that the suppression of malaria assists in the abolition of other water and insect-borne diseases.

vi. Carter elaborates the hypothesis that latent malaria parasites are quinine resistant because (1) the parasites that survive are less susceptible than normal to quinine, and (2) they live in an organ less accessible to the drug than the circulating blood. P. H. B.

Leger (André). **Le Paludisme dans le Haut-Sénégal et Niger. Index endémique de la Ville de Bamako.**—*Bull. Soc. Path. Exot.* 1914. Mar. Vol. 7. No. 3. pp. 181-184.

This paper embodies the results of blood examinations of 1,721 children, of whom 707 were less than three, and the remainder 3–15 years of age, all from Bamako or from the surrounding villages. The results are striking and may be summarised in the following table.

Years 1911 and 1912.	Children of 1 month to 3 years of age.			Children of 3–15 years.			Total percentage infected.
	No. examined.	No. infected.	Percentage.	No. examined.	No. infected.	Percentage.	
Wet season	385	369	95·85	474	403	85·21	90·53
Dry season	322	236	73·29	540	276	51·11	62·20

There appears to be a veritable malarial epidemic amongst the negroes during the season of the highest atmospheric temperature and greatest humidity. The children under three years are proportionally more heavily infected than those over this age. The quartan parasite is by far the commonest species, forming from 58·88 per cent. during the wet season and 49·53 per cent. during the dry season of the total number of infections with all the species of malarial parasites. The proportional infection with the subtertian parasite remains practically the same at all seasons; the tertian parasite is relatively rare. The following table gives an idea of the relative proportions of the different infections:—

Age of children examined.	Wet season.	Species of parasite.					
	No of children infected.	*P. malariae.*		*P. falciparum.*		*P. vivax.*	
1 month–3 yrs. of age.	369	213	57·72%	150	40·65%	6	1·63%
From 3–15 yrs. of age.	403	242	60·05%	135	33·49%	26	6·46%

These figures sufficiently indicate the intensity of malaria in the capital of Upper Senegal and the Niger, and the danger of these heavily infected villages as a source of infection.

P. H. B.

i. Sergent (Edmond). **Sur la Lutte contre le Paludisme.**—*Propaganda Antimalarica.* 1914. Apr. 30. Vol. 7. No. 2. pp. 25-28.

ii. Orta (Francesco). **Osservazioni sulla Malaria di Porto Corsini.**—*Ibid.* pp. 29-32.

iii. Saitta (Salvatore). **La Campagna Antimalarica in Troina nel 1913.**—*Ibid.* pp. 32-34.

iv. Sergi (Antonio). **La Profilassi Antimalarica nelle Scuole di Palizzi nel 1913.**—*Ibid.* p. 34.

v. Orta (Francesco). **Bonifiche e Malaria nel Ferrarese.** [Drainage Works and Malaria in the Province of Ferrara.]—*Ibid,* pp. 35-39.

vi. Sergi (Antonio). **Sulla Dottrina Zanzaro-malarica.** [On the Mosquito Theory of Malaria.]—*Ibid.* pp. 40-44.

i. A paper by the Director of the Pasteur Institute of Algeria, which discusses briefly, but in a very fair and impartial spirit, the general principles upon which a campaign against malaria should be carried on. In Algeria all the protective methods known are made use of, according to the judgment of those on the spot, without preference or prejudice. One excellent measure, however, may be specially noted. It is the practice in Algeria to run off the water periodically from all irrigation channels, so as to dry the bed of the stream thoroughly for a sufficient period to kill all mosquito larvae, wherever practicable;

and with this end in view all such channels, as far as possible, are laid out in duplicate so that the irrigation may not be interfered with.

ii and v are concerned with the local conditions of the province of Ferrara.

iii. The malaria of the year 1913, in Troina in Sicily, was mild in character, which the author attributes in part to the violent rain storm of October 12, 1912, which scoured out thoroughly all the water courses of the district.

iv. A short school report from the commune of Palizzi. No case of malaria occurred amongst 90 school children to whom quinine was administered daily, during the months of June and July, whilst the proportion of infected cases amongst the non-protected part of the population, during the same period, amounted to 4 per cent.

vi. A theoretical discussion of the subject of mosquito infection according to the views of various authorities.

J. B. Nias.

Rowley-Lawson (Mary). **A Stage in the Migration of the Adult Tertian Malarial Parasite. Evidence of the Extracellular Relation of the Parasite to the Red Corpuscle.**—*Jl. Experim. Med.* 1914. May 1. Vol. 19. No. 5. pp. 450-458. With 5 plates.

The scope of this paper may be indicated by a recitation of the author's conclusions.

These are :—

1. What appear to be certain definite stages in the migration of the malarial parasites from red corpuscle to red corpuscle may be demonstrated by thorough and persistent observations.

2. The migration of the malarial parasite from red corpuscle to red corpuscle gives a reasonable explanation of the loss of red corpuscles which cannot be accounted for by the destruction of the infected corpuscles at the time the parasites segment.

3. Migration to other red corpuscles is a satisfactory explanation of the ultimate fate of the young parasites seen in instances of multiple infection of single corpuscles.

4. In the light of the facts here presented, it would seem impossible to explain the instances of the parasites partly on and partly off degenerated red corpuscles as the result of technique. A stage in the migration of the parasite seems to be the probable interpretation.

5. Attachment to the external surface of the corpuscles seems to be the only possible explanation of the appearances of the parasites in the figures accompanying the paper.

[The paper is illustrated by one coloured and four photographic plates, comprising altogether some 78 figures, which, it must be confessed, cannot be regarded as convincing proof of the author's contentions. It is doubtful if her views will gain general acceptance.]

P. H. B.

Thomson (David). **The Origin and Development of Gametes (Crescents) in Malignant Tertian Malaria: Some Observations on Flagellation, etc.** (Being Part II of the Report on the Malarial Expedition to Panama, 1912).—*Ann. Trop. Med. & Parasit.* 1914. Apr. 21. Vol. 8. No. 1. pp. 85-104. With 1 coloured plate.

A report of work undertaken partly in conjunction with

Dr. W. M. James at the Ancon Hospital, Panama, and partly in the Royal Southern Hospital, Liverpool. The conclusions reached were as follows:

1. Crescents are produced from ordinary asexual spores of *P. falciparum*, and are the outcome of a development of immunity towards the latter.

2. They develop in some internal organ, afterwards appearing suddenly in the blood, requiring a period of about ten days for their development. They do not live to move than a few days in the peripheral blood, but their presence there for a longer period is due to the replenishment of their numbers from surviving asexual forms.

3. Quinine has no direct destructive action on crescents, either during or subsequent to their development, but it destroys the asexual source of supply.

4. In 20-grain daily doses it reduces their numbers to less than one per cmm. of blood within three weeks.

5. In the inner organs crescents develop chiefly in the bone-marrow and spleen.

6. The chromatin of the crescents stains fainter and is less abundant and more finely granular than that of the schizonts. The pigment in the developing crescents appears early, even in the youngest forms, and it remains scattered until the adult stage is reached, whereas in the schizont the pigment in all stages is more or less concentrated into one mass. The shape of the developing microgametocyte is often spherical. No evidence has been obtained of parthenogenesis in crescents.

7. Crescents subjected to thorough and continuous quinine treatment are yet able to exflagellate.

8. The spherulation of crescents is probably due to osmosis, which in turn probably stimulates the actual flagellation. The polar bodies are probably extruded chromatin; there is no reason for believing that crescents ever flagellate in the circulating blood.

P. H. B.

Henson (Graham E.). **Man, the Principal Etiologic Factor in the Perpetuation of Malaria, with Special Reference to the Endemicity of the Disease in the Temperate Zone.**—*Jl. Amer. Med. Assoc.* 1914. May 2. Vol. 62. No. 18. pp. 1374-1377.

A general paper dealing with (*a*) the detection of gamete carriers, (*b*) the formation of gametes in the circulation of man; (*c*) the transfer of these forms from one host to the other and the evolution of the parasites in man and the mosquito; and (*d*) the significance of early diagnosis and the rational treatment of all malarial infections.

P. H. B.

Bass (Murray H.). **Congenital Malaria.**—*Archives of Pediatrics.* 1914. Apr. Vol. 31. No. 4. pp. 251-258.

The author records a case of malaria of supposed congenital origin in an infant. The blood of an intensely anæmic baby (seven and a half weeks old) was examined microscopically and a large number of tertian parasites were found. The haemoglobin percentage is stated to have been between ten to fifteen per cent. From subsequent enquiries it was found that the mother had suffered from fever while five months pregnant, so that the infection in this case appeared to have taken place by penetration of the plasmodia through the placenta. Under quinine rapid improvement took place.

P. H. B.

Fuchs Wolfring (Sophie). **Réveil du Paludisme à la Suite d'une Cure de Tuberculine.** *Rev. de la Tuberculose.* 1913. Dec. 2 ser. Vol. 10. No. 6. pp. 407-411. With 1 plate and 1 fig.

An account of a relapse of malaria in Davos following on subcutaneous injection of tuberculin and occurring three years after the patient had left the endemic area (Turkestan) and apparently after a quiescent period of twelve years.

A very beautiful plate, depicting the quartan parasite, accompanies the article. P. H. B.

Rodenwaldt. **Immunität gegen Malaria bei Negern.** [Immunity from Malaria in Negroes.] *Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Apr. Vol. 18. No. 7. pp. 254-263.

Rodenwaldt disagrees with v. d. Hellen's statements (see this *Bulletin*, Vol 2, p. 316) that the negro soon loses his relative immunity to malaria and that only the negro children are affected. This is opposed to his experience in Togo, where every adult negro suffers from malaria, though the clinical symptoms may be very slight. P. H. B.

Mathis (C.). **Epidémie de Paludisme ayant sévi dans la Province de Sontay durante l'Eté de 1913.** *Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 388-391.

The author of this paper was deputed to investigate a febrile epidemic in certain villages of French Cochin China. Of 245 cases examined 21·2 per cent. were found to harbour malarial parasites. All three species of Plasmodium were represented.

Anopheles, such as *Myzorhynchus sinensis, pseudopictus, barbirostris, fuliginosus,* and *Myzomyia rossii* were present in considerable numbers (see also this *Bulletin*, Vol. 3, p. 433).

P. H. B.

Schüffner (W.) & Swellengrebel (N. H.). **De Anophelinen in Deli in verband met de Uitbreiding der Malaria.** [The Anophelines in Deli in connection with the Spread of Malaria.] *Geneesk. Tijdschr. v. Nederl.-Indië.* 1914. Vol. 54. Pt. 2. pp. 140-162. With 3 plates.

There has been a great increase in the amount of malaria met with on the eastern coast of Sumatra during the last few years, which the authors are inclined to attribute to an alteration in the distribution of mosquitoes.

Taking the sickness returns of the amount of malaria amongst the very large number of coolies, approximately 7,000 at the present time, employed on the tobacco plantation known as the Senembah Mij at Deli, they show that there has been an increase in the number of malarial cases annually, from an average of 17 per mille in the year 1906 and previously, to 79 per mille for the first half of 1913. The greatest increase was in the pernicious form, the next greatest being in benign tertian, while the amount of quartan remained practically

unaltered. After going through all the possible causes of this increase, the authors come to the conclusion that it is in some way connected with an increased prevalence of anopheline mosquitoes, and as a preliminary to the further investigation of the question they give a list of the species which have been found up to the present on the east coast of Sumatra. These are as follows :—

1. *Cellia kochi* (Dönitz 1901). Pathological importance uncertain.
2. *Myzomyia rossii* (Giles 1892). Probably not a carrier.
3. *Myzomyia vaga* (Dönitz 1902). A carrier at least of malignant malaria.
4. *Myzomyia leukosphyra* (Donitz 1901). Pathological importance uncertain.
5. *Myzomyia punctulata* (Dönitz 1901). Pathological importance uncertain.
6. *Myzomyia albirostris* (Theobald 1903). Carries all forms of malaria.
7. *Myzorrhynchus sinensis* (Wiedeman 1828). Probably not a carrier.
8. *Myzorrhynchus barbirostris* (v. d. Wulp 1884). Carries all forms of malaria.
9. *Myzorrhynchus albotaeniatus* (Theobald 1903). Pathological importance uncertain.

Three plates showing anatomical details of the above named species are appended.

J. B. N.

Chimisso (Luigi). **Contributo alle Manifestazioni Cutanee della Malaria con Particolare Riguardo a una Forma di Ectima.** [Contribution to the Cutaneous Manifestations of Malaria with Special Reference to a Form of Eczema.]—*Riforma Medica.* 1914. Mar. 28. Vol. 30. No. 13. pp. 345-348; and Apr. 4. No. 14. pp. 373-380.

The author gives a list of several skin lesions which are sometimes found in cases suffering from chronic malaria. Amongst these are mentioned papules, vesicles, boils, ulcers, herpes, urticaria, etc. He describes a form of eczema, amenable to quinine, which he believes is more or less characteristic of the disease.

P. H. B.

Emin (Ahmed). **Une Variété nouvelle du Parasite de Laveran.**—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 385–387. With 1 plate.

The author believes he has discovered a new malarial parasite in the blood of pilgrims at Camaran, an island in the Red Sea, some 30 miles from Hodeïdah.

In the younger stages the parasites resemble the benign tertian plasmodia, but fewer merozoites are formed and the gametocytes do not enlarge the host cell. It is not certain whether true Schüffner's dots are formed or not.

Laveran, in acknowledging this communication, stated as his belief that there are gradations between all the well-known types of malaria parasites, a fact to his mind in favour of the unity of all the species at present recorded.

P. H. B.

Butterfield (E. E.) & Benedict (L. S.). **On the Alleged Rôle of Hematin in the Production of the Malarial Paroxysm.**—*Proc. Soc. Experim. Biol. & Med.* 1914. Vol. 11. No. 3. pp. 80–82. With a curve.

In this paper a number of experiments are recorded on the effect of intravenous injections of haematin in causing a rise of temperature. The haematin was dissolved in ·9 per cent. salt solution containing 1·5 per cent. $NaHCO_3$. After intravenous injection of this solution in rabbits there was no resemblance in either temperature curve or other respects to the malarial paroxysm in man.

In addition to the experimental work on rabbits, the blood sera of 19 patients with malarial organisms in the blood were examined for haematin. In no case was haematin demonstrable.

P. H. B.

Malisch. **Oeffentliches Sanitätswesen. Die Malaria im Südösten Deutschlands.** [Malaria in South-East Germany.]—*Deut. Med. Wochenschr.* 1914. Apr. 9. Vol. 40. No. 15. pp. 763–764.

Malaria has almost died out in Germany; only four cases were microscopically diagnosed in the Hygienic Institute at Beuthen (East Germany) in 1912, but in Pless in 1913 Malisch verified its existence in 100 cases.

P. H. B.

Braddock (Charles S.). **Tropical Malaria and its Causes.**—*New York Med. Jl.* 1914. May 16. Vol. 99. No. 20. pp. 976-979.

Braddock, who has been a lieutenant in the U.S. Navy and has also travelled extensively in Siam, French Indo-China, the Federated Malay States, Ceylon and Egypt, believes that the mosquito is not the only carrier of malaria, but that the infection exists in water and in soil, whence the mosquito itself contracts the germs and transmits them to man. In some such manner as this the existence of epidemics in districts uninhabited by man may be explained.

[It is interesting to note that, even though the mosquito-malaria theory has received abundant confirmation, sceptics still flourish. Such a one is Dr. Braddock; but if he wishes to assail a well grounded theory in such a dogmatic manner, he would find it advisable to make certain of his facts. His statement, for example, with reference to the absence of anophelines in Mauritius is incorrect. A brief reference to Sir R. Ross's book, "The Prevention of Malaria," pp. 634 and 635, would have convinced him of this. *Pyretophorus costalis* has been incriminated, as a malarial carrier, by Ross, Stephens, Christophers, Annett and Austen and is undoubtedly the chief carrier in that island.]

P. H. B.

Prophylaxis.

Fisch (R.). **Die Wirkung der Malariaprophylaxe bei den Missionsangestellten in Kamerun.** [Malaria Prophylaxis in the Kamerun Missionary Stations.]—*Beiheite z. Arch. f. Schiffs- u. Tropen.-Hyg.* 1914. Apr. Vol. 18. Beiheft 4. pp. 5-39. [pp. 121-155]. With 18 figs.

This paper embodies a summary of replies to a series of detailed questions addressed to members of the Basel Mission in Kamerun. By these means it was hoped to gain some idea of the efficacy of the various forms of malaria prophylaxis both medicinal and mechanical, though the author thinks the latter method can hardly be seriously considered at the present moment.

The quinine prophylaxis of Koch (1 gramme every 6th or 7th day), as well as that advocated by Plehn (·5 gramme every 5 days), have both been abandoned and in their place systematic dosage of ·8 to 1 gramme of quinine hydrochloride every fourth day has been substituted. The author believes that prophylactic quinine in too small and too frequent dosage is not to be encouraged as being apt to favour the development of quinine resisting gametes. 459 returns were sent in, concerning 91 men, 73 women, 132 children (75 boys and 57 girls). Save for the matter of quinine prophylaxis the conditions under which the Missionaries labour are the same to-day as thirty years ago, therefore the author considers a contrast between the mortality returns at different periods can reasonably be instituted. The pre-prophylactic period lasted from 1886–1897, and the prophylactic from 1897–1913.

For statistical purposes the numbers are divided into three groups : (*a*) the non-prophylactics, 57 men and 31 women, 88 persons ; (*b*) prophylactics taking less than ·8 gramme quinine twice a week, 17 men and 29 women, 46 persons ; (*c*) prophylactics taking more than ·8 gramme quinine twice a week, 36 men and 19 women, 55 persons.

The 88 persons in the first group served an average period of two to four years without a return to Europe, and those of the second and third groups 3 to 5 and 4 years respectively, but these figures are by no means so impressive as the following. Of the non-prophylactics only 59 per cent. returned to Kamerun, while of the prophylactics of the first class 87 per cent., and of the second no less than 100 per cent.

Accurate statistics of the morbidity and mortality from malaria and blackwater fever have been kept for the last twenty-eight years. From them it appears that from 7·4 per cent. of the non-prophylactics died from these diseases, while of the prophylactics of the first and second classes no single death from malaria is recorded, though 59 per cent. of the former and 41·7 per cent. of the latter suffered from attacks of malaria from time to time. The last death from malaria occurred in one who in deference to religious scruples, refused to take quinine. He died after being nine months in the country.

Blackwater fever appears to have been a frequent complication in the pre-prophylactic period, 49 cases with 16 deaths having been recorded, but in recent years amongst the prophylactic there appears to have been but 13 cases with one death. Four cases of blackwater with one death are recorded from a series of 40 non-prophylactic children ; and only one, who eventually recovered, from a series of 64

prophylactics of a similar age. If the gross mortality from all causes be divided into quinquennial periods the following telling figures emerge.

Period	Number of Missionaries.	Death rate per cent.
1886–1892	35	25·7*
1892–1897	59	10
1897–1902	87	3·4
1902–1907	125	4
1907–1913	164	1·2

Had conditions in the last quinquennial period been similar to those prevailing in the earlier days of the history of the Mission, no less than 39 deaths would have been a reasonable estimate instead of the two deaths which actually did occur.

P. H. B.

Diagnosis.

Bosco (P.). **Sul Valore Pratico dei Thick Films per la Diagnosi microscopica della Malaria.** [The Practical Value of Thick Films in the Microscopic Diagnosis of Malaria.]—*Policlinico.* Sez. Medica. 1914. May 1. Vol. 21. No. 5. pp. 238-244.

The author gives his experience of the thick film method recommended by W. M. James in the *Southern Medical Journal* for December 1910 for the rapid detection of the parasites of malaria, and is of opinion that it is not more certain in its results than the ordinary thin film process, but decidedly more expeditious. Comparative tests were made on patients under treatment with quinine, and the final disappearance of parasites from the blood was ascertained as readily by the ordinary process as by the thick film method, if sufficient time were given to the examination. A few trifling modifications of the technique are described, such as placing the slide in a weak solution of bicarbonate of soda in order to neutralise the acid of the acid alcohol, instead of continued washing in running water. The author gained his practical experience of the value of the method with the army in Libya. Too long an immersion of the films in the acid alcohol used for fixing, say for more than 12 hours, will dissolve the pigment of the parasites, especially of the crescentic forms, a fact of which use may be made when it is desired to bring out the chromatin of the parasites more clearly.

J. B. N.

Frassetto (Augusto). **Sulla Presenza di Autolisine Endo ed Extraglobulari nel Sangue dei Malarici.** [On the Presence of Endo- and Extraglobular Autolysins in the Blood of Malaria Patients.]—*Malaria e Malat. d. Paesi Caldi.* 1914. Mar.-Apr. Vol. 5. No. 2. pp. 79-84.

Investigating this question by De Blasi's methods, the author was unable to find any trace of autolysins in the serum of 15 cases of malarial infection, either with the undiluted serum or in a dilution of

*Four deaths from Malaria, 5 from Blackwater.

1 : 5, but in one case of chronic malarial cachexia a feeble autolytic reaction was obtained. The sera were tested both at room temperature, and after heating to 55°, 60°, 65°, and 70° Cent. for 30 minutes. On the other hand, the aqueous extract of malarial blood, in contradistinction to that of non-malarial, will exhibit a constant autolytic reaction which, however, is variable in amount, and is most marked in chronic relapsing cases. The results are shown in tabular form at the end of the paper.

[See also a paper by Zoia on the same subject, this *Bulletin* Vol. 2, p. 560.]

J. B. N.

Treatment.

i. Tresidder (A. G.). **A Case of Malarial Coma lasting 46 Hours; Recovery.**—*Lancet.* 1914. Mar. 28. pp. 891-892. With 1 chart.

ii. Ross (Ronald). **Intramuscular Injections of Quinine.** [Correspondence.]—*Ibid.* Apr. 4. pp. 1003-1004.

i. A soldier, who had been taking quinine for some time previously, became suddenly unconscious; the dilated pupils, absence of ocular paralysis, normal fundi oculorum, spasticity of the legs, incontinence of urine, and high temperature (102° F.), in spite of a negative blood examination, combined to make malarial coma the most probable diagnosis. This was confirmed by the rapid return to consciousness after repeated intramuscular injection of quinine hydrochloride. Epileptiform convulsions rendering his condition critical were treated by rectal salines; at this stage the urine contained one-tenth albumin, though a week after the comatose attack the urine became normal. A transitory delusional insanity delayed convalescence. The author considers that as the underlying pathology of this condition is due to a blocking of the cerebral vessels, it is essential to destroy the parasites as well as to push them out of the cerebral capillaries; he suggests that treatment should be commenced with an intravenous injection of 5–10 grains of quinine hydrochloride.

ii. Writing in reference to the above case Sir Ronald Ross points out that experiments carried out for several years past have shown that quinine is absorbed with very great difficulty from the muscular and subcutaneous tissues. The dose given by intramuscular injection generally remains *in situ* and, if the case is a dangerous one, the parasites are allowed to multiply unchecked in the patient's blood. He thinks that the profession should be warned against using these injections except in some rare cases.

P. H. B.

Peiper (Otto). **Ueber Malariabehandlung mit Hydrochinin. Ueber Papatacifieber.** [The Treatment of Malaria with Hydroquinine.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Apr. Vol. 18. No. 7. pp. 221-232.

After an extended trial of hydroquinine on 19 tertian and subtertian infections (no cases of a quartan infection were discovered), Peiper concludes that hydroquinine is a very efficient drug in malaria, equally

as efficient as the alkaloid in subtertian infections and more especially in the benign tertian. Subcutaneous and intramuscular injections of the drug are not to be recommended.

P. H. B.

Clarenc (H.). **Les Méthodes d'Administration de la Quinine.**—*Bull. Soc. Méd. de l'Ile Maurice.* 1913. Oct.-Nov.-Dec. Vol. 31. 2me Serie. No. 34. pp. 51-63.

This paper contains a few original observations on the methods of administering quinine in therapeutic doses. The author has had good results with a combination of quinine and a decoction of *Azadirachta indica* (Neem or Margosa Bark) a plant which possesses a high percentage of tannin and has acquired a reputation as a febrifuge in India. Clarenc prepares an extract from the leaves which he combines with quinine in pill form.

P. H. B.

Baermann (G.). **Zur Wirkung des Hydrochinin und seiner höheren Homologen (Aethylhydrokuprein u. a.) bei Malaria.** [The Action of Hydroquinine and its Higher Homologues in Malaria.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. May. Vol. 18. No. 9. pp. 293-306.

As our knowledge of malaria grows more extensive, it is becoming apparent that certain local varieties of the disease are completely resistant to the action of quinine. In view of this experience many workers have striven to discover a derivative of quinine with higher parasitotropic properties than the pure alkaloidal base, which would be capable of destroying the more resistant gamete forms.

Baermann's observations on hydroquinine were made on the east coast of Sumatra where the epidemic malaria appears to be of a particularly mild type. 78 cases were treated in all, and the blood was examined in some instances twice daily. 1 gramme of hydroquinine was injected intravenously in twelve cases repeated on four occasions. In a third of this number this dose was sufficient effectually to clear the blood of parasites and to prevent any further relapses.

To six cases hydroquinine, in doses of from ·4 to ·6 gramme, was administered by the intramuscular route and of these four remained free from further relapses.

Ethylhydrocuprein in doses of ·5 gramme injected intramuscularly was found to be particularly effective, though the local reaction after its use is more intense and gives rise to a certain amount of inconvenience; intravenous injections were not followed by nearly such good results. In two cases only doses of ·5 to ·75 gramme sufficed to sterilize the blood; per os the drug (2 grammes four times daily) proved to be unsuitable. Isopropylhydrocuprein hydrochloride (·2 gramme three to four times daily for 5–8 days) exhibited antimalarial properties of a high order. On the other hand Isoamylhydrocuprein has only a feeble action and Isopropylhydrocuprein and Isoamylhydrocuprein bases appear to have no action at all. [See also this *Bulletin*, Vol. 3, p. 147, p. 257, and p. 435.]

P. H. B.

MUEHLENS (P.). **Behandlung akut bedrohlicher Zustände bei Tropenkrankheiten.** [The Treatment of Acute Symptoms in Tropical Diseases.]—*Deut. Med. Wochenschr.* 1914. Apr. 9. Vol. 40. No. 15. pp. 737-740.

Acute symptoms are met with in all three varieties of malaria. Their causes may be stated as follows :—(1) Heavy blood infection or exalted virulence of the parasites. (2) Individual disposition of the patient. (3) Complications of other disease conditions. (4) Rupture of the spleen. (5) Blackwater fever.

Muehlens thinks that in all serious cases, especially in malignant infections, it is advisable to apply a combined quinine and salvarsan treatment. The quinine may be given by the intramuscular, the salvarsan by the intravenous route, or *vice versa*. He recommends a new preparation of salvarsan called Arsalyt (dose ·1 gramme to every 10 kilogrammes body weight) ; a 4 per. cent solution is injected directly into a vein with a 20 cc. syringe.

P. H. B.

POPE (Curran). **Chronic Malaria Cachexia and its Relation to Neurasthenoid Conditions.**—*Boston Med. & Surg. Jl.* 1914. Feb. 5. Vol. 170. No. 6. pp. 193-197.

A clinical lecture which concerns itself largely with the treatment of malarial cachexia and the differential diagnosis of the condition from neurasthenia.

The author believes hospital or sanitorium treatment to be absolutely essential for the complete relief of these patients and their return to normal activity.

During treatment acute malarial attacks have occurred. The author is positive that these attacks are brought about by forcible concussion of the twelfth dorsal, first, second and third lumbar vertebrae by a very powerful jet douche which he considers produces contraction of the spleen with subsequent liberation of malarial organisms and a resulting attack of malaria. In several cases he has noticed that such an attack occurs after a mechanical concussion of these vertebrae.

He believes that these cases are best treated by massage, manual and mechanical, and by electro- and hydrotherapy. Bedridden cases are warm-sponged and subsequently rubbed with a rough towel ; ambulatory cases are treated with hot pack and subsequently with application of cold water ; and, for medicinal treatment, he believes iron and arsenic to be superior to quinine.

[The lowering of the vital resistance by the application of cold water to the spine seems to the reviewer a much more acceptable explanation of these malarial relapses than the more original one advanced by the author.] P. H. B.

SCHWYZER (Fritz). **Erfahrungen über chronische Malaria.** [Experiences in Chronic Malaria.]—*Correspondenz-Blatt. f. Schweizer Aerzte.* 1914. Mar. 7. Vol. 44. No. 10. pp. 294-305.

A clinical lecture on malaria containing no new or original observations. The author is no believer in quinine prophylaxis. He

thinks that Warburg's tincture (a 2 per cent. alcoholic solution of quinine with the addition of cubebs, camphor, and rhubarb) is only of value in cases of malarial neurotics.

P. H. B.

Animal Malaria.

Seidelin (Harald) & Connal (Andrew). **A Note upon the Occurrence of a Plasmodium in the Blood of West African Monkeys.**—*Ann. Trop. Med. & Parasit.* 1914. Apr. 21. Vol. 8. No. 1. pp. 81-82.

Pigment-containing parasites were found in three young monkeys, *Papio sphinx* and *Cercopithecus mona*, at Yaba near Lagos.

The parasites—mostly gametocyte forms—were extremely scarce and differed in various respects, such as the yellow colour of the pigment and faintness of the stained chromatin, from human malarial parasites.

The authors believe that the chief interest in this communication is the occurrence of this infection in young monkeys and not in old ones, and it is possible that infection in these animals may conform to the same rule as applies to human malaria, and that with increasing age a natural immunity is developed. [See also paper by Leger and Bouilliez, this *Bulletin*, Vol. 3, p. 159.]

P. H. B.

Erratum.

Vol. 3, No. 8, p. 432, last line: In the sentence "Professor Stephens proposes to call the new parasite *Plasmodium pertenue*," the name *Plasmodium pertenue* should read *Plasmodium tenue*.

G. C. L.

BLACKWATER FEVER.

GRIENWANK (E.). **Quelques Considerations étiologiques et thérapeutiques sur la Fièvre bilieuse hémoglobinurique.**—*Gaz. Hebd. des Sci. Méd. de Bordeaux.* 1913. Sept. 7. Vol. 34. No. 36. pp. 421-423.

In French West Africa blackwater fever makes its appearance directly the cold winds of autumn are felt, that is about the end of September.

In treatment Grienwank employs serum in the proportion of 15 to 100 parts of a solution containing 15 grammes of sodium chloride to a litre of water, which must be injected subcutaneously as soon as possible in quantities of 250–300 cc. Serum saline is preferred to plain saline as being less irritating to the kidneys. The same quantity is injected every eight hours till the urine becomes clear.

In cases with a tendency to suppression he gives the injections as before and applies blisters to the lumbar region. He condemns the practice of giving chloroform water to allay the vomiting.

Quinine is contra-indicated till after the attack. As a demulcent he advises the following concoction :—

Lactose, grammes 40.
Sodium chloride, grammes 15.
Tincture of Kinké liba (an African plant well-known for its diuretic properties), 1,000 grammes.

P. H. Bahr.

VINSON (L.). **Contribution à l'Etude de la Malaria.**—*Bull. Soc. Méd. d'Ile Maurice.* 1913. July-Aug.-Sept. Vol. 31. 2me Série No. 33. pp. 37-44.

This paper records a case of blackwater fever with cerebral complications in a man of 45 years of age, the subject of a subtertian infection. The author thinks that quinine given by the intravenous route can have no influence on the production of haemoglobinuria, for in this case recovery rapidly ensued after the intravenous injection of one gramme of quinoform. A further point of interest was that several members of the patient's family exhibited a tendency to haemoglobinuria.

P. H. B.

HELMINTHIASIS.

Distomiasis.

Ssimintzin (D.). **Neue Tatsachen über die Biologie der *Fasciola hepatica* L. Vorläufige Mitteilung.** [New Researches on the Biology of *Fasciola hepatica*.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1914. June. 13. Vol. 74. No. 3/4. pp. 280–285. With 3 figs.

Experimenting with the cercariae of *Fasciola hepatica* after they escape from the mollusc *Limnea truncatula* the author finds that they may become encysted in the water instead of on grass as they are generally supposed to do. He has found that 66 per cent. encyst about ½ cm. below the surface of the water, 24 per cent. deeper and 10 per cent. higher, of which latter 6 per cent. are encysted in cysts which actually remain on the surface of the water. It results therefore that animals and man can readily be infected through drinking this water.

This method of infection was studied in rabbits. The young flukes escape from the cysts in the intestine and then make their way into the peritoneal cavity where they can be found from the fourth to the fourteenth day. They then invade the liver as well as other organs and enter these by actually forcing their way through the peritoneal surface of the organs.

C. M. Wenyon.

Nakagawa (K.) **Experiments on the Development and Resisting Power of the Ova and Embryo of *Distoma pulmonalis*.** [In Japanese] —*Jl. of the Med. Soc. of Tokyo.* 1914. Jan. Vol. 28. No. 2.

The author artificially hatched the ova of *Distoma pulmonalis* [*Paragonimus westermani*], taken from the sputum of a patient who was suffering from distomiasis of the lungs. He traced their development and made a few animal experiments. He concludes that :—

1. The ova of *Distoma pulmonalis* are generally swollen according to their development.

2. The life of the embryo which has escaped into water is very short.

3. The most suitable temperature for the development of the ova seems to be 25°–31° C., and the embryo emerges after 23–27 days.

4. Sunshine prevents hatching ; a dark place is most suitable for development.

5. Oxygen is necessary for hatching.

6. The ovum dies if it is dried.

7. The full grown ova and embryos are very easily killed by the acid of the stomach.

8. In the animal experiments the embryo never entered the body by the mouth or skin.

M. Kumagawa.

Pons (J. A.). **Paragonomiasis.**—*Revista Med. de S. Paulo.* 1914. Mar. 31. Vol. 17. No. 6. pp. 92-94.

A well-written account of this disease for the information of Brazilian readers. It contains, however, nothing that will not be found in the latest editions of English text-books on tropical medicine. The author does not quote any cases.

J. B. Nias.

Schistosomiasis.

Conor (A.). **Essais de Transmission de la Bilharziose.**—*Bull. Soc. Path. Exot.* 1914. Mar. Vol. 7. No. 3. pp. 202-206.

The author has attempted to obtain support for the theory of Looss that the miracidia of *Schistosoma haematobium* bring about infection of man by penetrating the skin. Miracidia free from urine were obtained by centrifuging the urine and washing the eggs in water. The experimental animals were carefully examined post mortem, special attention being paid to the bladder, intestine, liver, portal vein and the area of skin on which the experiment was made.

One monkey was inoculated subcutaneously six times but showed no sign of infection. Another monkey received seven similar injections with no result. A monkey was inoculated in the thigh and died four days later. At the site of inoculation there were found three empty egg-shells and one egg containing a motionless embryo. A fourth monkey received three injections with no result. Similar fruitless experiments were made on eight sheep, two rabbits, three guinea-pigs and a rat.

In another series of experiments the liquid containing the living miracidia was simply deposited on the skin. Four supplies of this fluid were placed on the skin of a sick monkey at half-hour intervals. The animal died next day and the skin at the site of experiment was carefully removed. The under surface was scraped and in the scrapings were found four embryos which were easily recognised. Another monkey similarly treated gave a negative result.

Two rabbits inoculated intrahepatically gave negative results.

Two monkeys were immersed in water at 30° C. for eight successive days for half an hour on each occasion. To the water, a quarter of an hour before each immersion, was added urine containing eggs. The experiment gave a negative result.

In all these experiments only one was successful. The author intends to repeat and continue the experiments when opportunity arises.

C. M. W.

Hooton (A.). **A Case of Bilharzia Disease.** *Indian Med. Gaz.* 1914. May. Vol. 49. No. 5. p. 188.

The case recorded is of a Parsee girl aged 5 years in Rajkot, India, who suffered from haematuria for ten days. Examination of the urine showed a few terminal spined eggs of Bilharzia. After treatment with calcium chloride the haematuria ceased.

C. M. W.

Balfour (Andrew). **Febrile Intestinal Schistosomiasis and its Occasional Resemblance to Febrile Appendicitis.**—*Brit. Med. Jl.* 1914. Apr. 25. p. 915.

Writing from Caracas, Venezuela, Balfour says that Dr. Gonzalez-Rincones has informed him that only intestinal schistosomiasis is known in Venezuela and in connection with it there is often a febrile condition similar to that described by Archibald in the Sudan (see this *Bulletin* Vol. 3, p. 289). In some cases it has led to a faulty diagnosis of appendicitis.

C. M. W.

Chastang. **Comptes Rendus de Parasitologie.** [*Schistosomum japonicum* et **Fièvre du Yang-Tse.**]—*Arch. de Méd. et Pharm. Navales.* 1914. May. Vol. 101. No. 5. pp. 321-323.

The author points out that the enlargement of the liver and spleen associated with *Schistosoma japonicum* infection, is often accompanied by a type of fever fairly common in the Yangtse Valley. There is fever in the evening up to 40° C. with a fall to about normal in the morning. This may recur for three days, seven days or even longer and is accompanied by gastro-intestinal disturbance and sometimes by a transient urticarial eruption. The attack is followed by great depression. The blood examination shows no malarial parasites but a marked eosinophilia. The eggs of the Schistosoma are common in the faeces.

The disease is especially common amongst those who work on or near water as is to be expected from the mode of infection. This explains the fact of the disease being commoner amongst men. The author mentions that Hutcheson has noted that the treatment of cases of dysentery with emetine, when both amoebae and eggs of Schistosoma are present, has given very good results. He was accordingly led to try this drug in cases in which eggs alone were present. The results were very promising.

C. M. W.

Taeniasis.

Rossi (A.). **Sulla Patogenesi dell'Anemia da Tenia nana (Ricerche cliniche e sperimentali).** [On the Pathogeny of *Taenia nanum* Anaemia.]—*Il Morgagni.* Archivo. 1914. Mar. Vol. 56. (Part 1). No. 3. pp. 99-108.

The author tested the serum from a case of *Taenia nanum* infection on the red corpuscles of the infected individual, of healthy individuals, and of rabbits, with the result that he found that the toxin elaborated by the worm increases the haemolytic power of the blood and so brings about an excessive destruction of red cells. The anaemia thus produced is increased by the loss of blood constantly going on by way of the intestine. The blood-producing organs are in great part able to compensate for this loss, but in cases of long infection when a number of worms are present this may not be sufficient to prevent severe anaemia.

C. M. W.

Blanchard (R.), Leroux (Ch.) & Labbé (R.). **Encore un Cas de *Dipylidium Caninum* à Paris.**—*Arch. de Parasit.* 1914. Mar. Vol. 16. No. 3. pp. 438-447 ; and *Bull. Acad. Méd. Paris.* 1913. Séance du 9 Dec. 3 ser. Vol. 70. No. 3. pp. 438–447.

In this paper the authors have collected data referring to *Dipylidium caninum* infections in man. In all 76 authentic cases have been reported from various parts of Europe, United States, Venezuela and South Africa. The authors point out that as the worm is a natural parasite of the dog and cat, with the flea as intermediary host, infection of man probably takes place through these arthropods falling into drinking water, milk and food.

C. M. W.

Vincenzo (Rosei). **Di un Caso rarissimo di Infestazione umana di *Dipylidium caninum* (Lin.).** [A Rare Case of *Dipylidium caninum* Infection in a Human Being.]—*Policlinico.* Sez. pratica. 1914. Mar. 29. Vol. 21. No. 13. pp. 456-460.

A report of a case of Dipylidium infection in a child aged 4 years from Offida (Ascoli) in Italy. During a period of seven or eight months the child constantly passed segments of the worm without being in any way upset by the infection.

C. M. W.

Stuart (E. Gertrude). **Hydatid of the Omentum.** [Correspondence.] —*Brit. Med. Jl.* 1914. Mar. 7. p. 531.

Two cases of hydatid of the omentum are described from Quetta, India. The first, a Brahmin woman, aged 30, had had increasing swelling of the abdomen for two or three years. When the abdomen was opened it was found to be occupied by cystic swellings of all sizes up to a foetal head. Forty-two of these were removed, while others had to be left owing to the bad condition of the patient under the anaesthetic. Three weeks later there was another operation and later some of the other cysts which had enlarged were tapped. The woman left before cure was complete. In the second case there were multiple cysts in the abdomen, but many had broken down, while others were filled with pus and matted together. The patient died 24 hours after operation.

Mention is made of two cases of hydatid of the orbit in Pathans for which excision of the eye was undertaken.

C. M. W.

Casaux (J.). **Deux Observations de Kyste hydatique du Foie chez des Annamites.**—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1914. Apr. Vol. 5. No. 4. pp. 136-141.

A record of two cases of hydatid of the liver in natives of Annam. These are the first cases to be reported from Indo-China in natives, though, from their habits and mode of life, one would expect them to be more frequently infected than Europeans, several cases amongst whom have been reported from the colony.

C. M. W.

ANKYLOSTOMIASIS.

i. DUNBAR-BRUNTON (James). **An Unusual Case of Ankylostoma Infection.**—*Brit. Med. Jl.* 1914. May 2. p. 965.

ii. LOOSS (A.). **A Mistaken Case of Ankylostoma Infection.** [Correspondence.]—*Brit. Med. Jl.* 1914. June 13. pp. 1327-1328.

i. An Englishwoman complained of intense itching on various parts of the body. This came on usually in the afternoon and passed off in a few hours. There were anaemia, want of appetite and severe epigastric pain. The itching was so intense that it could only be relieved by scratching, which was continued till small needle-like objects were removed from the skin. On examination these were found to resemble embryos of *Ankylostoma duodenale.* Subsequently these appeared in enormous numbers in the mouth, throat, cheek and windpipe, where they caused much coughing and retching. They also seemed to pass out of the tongue. Treatment by thymol, followed by sulphur tabloids for several days brought about a rapid cure. The author can advance no theory to explain this extensive migration of embryos outwards.

ii. Looss, commenting on this case, points out that apart from the fact that the embryos of the Ankylostoma are too small to be detected with the naked eye under the conditions described, the whole life-history of the helminth is against the view that the objects removed from the skin were such as they were supposed to be. It is also pointed out that the fact that the individual was a European renders the Ankylostomic view very improbable. What the objects were Looss cannot conceive but he is quite convinced that the size alone makes it impossible that they were Ankylostome embryos.

C. M. W.

BLIN (G.). **L'Uncinariose chez les Chercheurs d'Or et les Forcats du Maroni.**—*Ann. d'Hyg. et Méd. Colon.* 1914. Jan.-Feb.-Mar. Vol. 17. No. 1. pp. 149-176.

This paper is a lengthy report on the distribution of Ankylostomiasis amongst the inhabitants of Maroni in French Guiana. Amongst the convicts the disease is very widespread, for of 732 admitted to hospital during the year 1912, 533 were recognised clinically as suffering from the disease. The condition of affairs is even worse amongst the free living and independent population of the Upper Marmi, where the people live in very primitive fashion and quite without the restrictions of the convicts. The sanitary arrangements are so bad that individuals must constantly be re-infecting themselves with larvae which escape from the eggs that they themselves have deposited. These larvae have every chance of entering by the skin or in the drinking water.

It was found that amongst the convicts 90 per cent. of the cases harboured Necator and the remaining 10 per cent. Ankylostoma. Of those of the free population who were infected. 75 per cent. harboured Necator and 25 per cent. Ankylostoma. Apparently all races, ages and sexes are affected alike. The cases are divided into three categories. The most numerous are those who have an infection without being in the least inconvenienced. Then there are the cases of infec-

tion in which the symptoms are chiefly those of some other disease, which possibly hide those actually due to the helminths. Finally there are the cases, happily least numerous, in which the condition of anaemia induced by the helminths is very intense. Many of these cases also suffer from malaria. During 1912 amongst the convicts 983 were found to harbour the worms. There were in all 81 deaths from disease and of these 24 appear to have died from uncomplicated ankylostomiasis. In about 22 per cent. of the cases there is a mixed infection with other helminths, either Ascaris, Oxyuris or Trichocephalus. The author met with a double infection of Necator and Ankylostoma nine times.

As prophylactic measures amongst the free population the following are recommended :—Education, protection of the exposed skin by bandages, washing of the hands before taking food, changing the clothes before sleeping at night, frequent disinfection of the working clothes with boiling water, careful guarding of the water supply from pollution, frequent distribution of quinine, the emphasising of the dangers of alcoholic excess, and energetic treatment of any persons infected.

For the convict population a similar series of recommendations is made with the difference that in their case compulsory measures can be enforced.

C. M. W.

GILL (C. R.). **Uncinariasis or Hookworm Disease. Being the Record of a Campaign in Porto Rico against the Hook Worm.**—13 pp. 1913. San Juan, Porto Rico.

In this paper the author points out that since ASHFORD's discovery of uncinariasis in Porto Rico in 1899 an immense amount of work has been done there. The island has been divided into districts with an "anemia station" placed in each, under the charge of a "health officer," and here thousands of cases of hookworm disease have been regularly treated. The author, who has had nine years' experience of combating the disease, presents in this paper a report upon 316 of his last cured cases. By "cured" he means cases which have ceased to pass eggs in the stool. The facts in connection with the cases are set forth in a series of tables. His conclusions are :—

1. The great majority of patients are of the white race.
2. Both sexes are equally affected.
3. No age is exempt.
4. The haemoglobin percentage had an average of 10–40.
5. The clinical form was as a rule that of an intense infection, the symptoms being those of the severe anaemia.
6. Many of the patients had also *Ascaris lumbricoides* and *Trichocephalus dispar*.
7. The number of doses of vermifuge required to cure varied from 5–16.
8. The dose of Thymol varied from $\frac{1}{3}$ to $\frac{1}{2}$ gram for a child to 4 grams for an adult. The drug was given in powder form in gelatine capsules and in divided doses. It was always preceded and followed by a proper dose of sodium sulphate. Alcohol was forbidden as it dissolved thymol too rapidly.
9. The ova of the Ascaris and Trichocephalus often persisted after the hookworm ova had disappeared.

10. At the time of discharge the haemoglobin had always enormously increased.

Finally the author points out that at the commencement of the campaign in Porto Rico it was estimated that 90 per cent. of the rural population were infected. This proportion has now been reduced at least by half.

C. M. W.

Levy (Robert L.). **A Case of Infection with *Agchylostoma duodenale* treated with Oil of Chenopodium** (With Demonstration of Specimens).—*Johns Hopkins Hospital Bull.* 1914. May. Vol. 28. No. 279. p. 160.

The case recorded is one in which thymol repeated three times failed to rid the intestine of hookworms. Accordingly oil of chenopodium was tried with good result. The patient starved for eight hours and was then given an ounce of Epsom salts. Two hours later 16 drops of the oil were administered in a teaspoonful of granulated sugar. Two further doses were given at two-hour intervals. Two hours after the last dose an ounce of castor oil and 50 minims of chloroform were taken. During the next 24 hours 19 worms were recovered, but eggs were still passed. Treatment was repeated again after 5 days when 7 more worms were expelled. There were no longer any eggs, but a further course was undertaken. The patient recovered rapidly and gained 30 lbs. in weight. The advantages of the drug over thymol are (1) it is more efficacious, (2) it is not unpleasant to take, (3) there are no disagreeable after effects, and (4) in therapeutic doses it is never toxic.

C. M. W.

Carini (A.). **La Bonifica Umana nella Lotta contro l'Anchilostomiasi.** [The Gain to Humanity of a Campaign against Ankylostomiasis.] —*Rivista d. Igiene e d. Sanità Pubblica.* 1913. Vol. 24. 8 pp.

An appeal by the author, who is Director of the Pasteur Institute of San Paulo, in Brazil, to the authorities of that State to institute a campaign against ankylostomiasis, on the lines already adopted for malaria, by means of a systematic distribution of thymol, suitably made up into doses for self-administration. It is pointed out that, with a sparse agricultural population distributed over an enormous area, there is no other means of dealing with this evil effectively.

J. B. N.

Rho (F.). **La Lotta contro l'Anchilostomiasi. Problema nazionale e mondiale e più specialmente tropicale.** [The Campaign against Ankylostomiasis—a National & World-wide Problem, especially in the Tropics.]—*Ann. d. Med. Navale e Colon.* 1914. Feb.-Mar. Anno 20. Vol. 1. No. 2–3. pp. 218-226.

In this paper the author reviews the position of ankylostomiasis from the point of view of distribution, prophylaxis, diagnosis and treatment. He points out, what everyone knows, that its suppression is a national and world-wide question of greatest importance in the tropics.

C. M. W.

De Faria (Gomes). **Ainda sobre o *Agchylostoma braziliense* (Gomes de Faria 1910). Resposta ao trabalho de R. Leiper: The Apparent Identity of *Agchylostoma ceylanicum*, Looss 1911, and *A. braziliense* (Gomes de Faria 1910).** [A Further Note on *Agchylostoma braziliense*, etc. Reply to the paper of R. Leiper, entitled, etc.].—*Brazil Medico.* 1914. Mar. 22. Vol. 28. No. 12. p. 113.

Gomes de Faria, in this brief note, refers to Leiper's suggestion (see this *Bulletin* Vol. 2, pp. 632–633), that *Ankylostoma ceylanicum* Looss 1911) and *A. braziliense* (Gomes de Faria 1910) are the same. In support of his contention that the two are distinct Gomes de Faria makes quotations from a letter from Professor Looss who is stated to have written in the following terms :—

A. braziliense has only a single tooth on each side which corresponds to the medium one of *A. duodenale*; the outer and inner teeth are completely wanting. *A. ceylanicum* has an inner tooth, which I now see to be frequently larger even than the one drawn in my Ankylostoma publication.

The length and slenderness of the bursal rays, especially of the external dorsal ray, is remarkable since in *A. ceylanicum* all the rays are thicker and plumper. The relative thickness of the bursal rays in similar species of Ankylostoma is a definite differential character but this point is emphasised by no recent writer. On the other hand one finds full descriptions of the arrangement of the rays which is the same for all Ankylostoma, and complete details of the terminal divisions of the dorsal ray which vary in nearly every individual.

In my opinion therefore *A. braziliense* and *A. ceylanicum* represent two independent and easily differentiated species.

C. M. W.

Ascariasis.

Macgregor (R. F.). **Ascaris Infection.**—*Indian Med. Gaz.* 1914. May. Vol. 49. No. 5. pp. 187-188.

The author records the case of a soldier from Tukdah, India, who had an attack which very closely conformed to the text-book descriptions of cholera. On examination of a smear of the faeces numerous Ascaris eggs were found. The patient was then given santonin after which numerous worms were either vomited or passed per rectum. The passage of the worms was often preceded by severe colic. In all 56 worms were recovered. The treatment lasted 20 days during which time the eosinophiles dropped from 20–25 per cent. to 19 per cent. A week later another worm was passed when the eosinophiles fell to 2 per cent.

C. M. W.

Borini (Agostino). **Pseudo-Appendicite da Ascaridi.**—*Arch. de Parasit.* 1914. Mar. Vol. 16. No. 3. pp. 428-431

The case recorded is of a female patient age 21 years who appeared to be suffering from appendicitis. After a dose of castor oil and santonin two Ascarides were passed. As an examination of the faeces revealed numerous eggs the treatment was continued with the result that in all 32 worms were passed and recovery ensued. The symptoms appear to have been due to the presence of the worms in the caecum.

C. M. W.

GENERAL.

NIGERIA. **Entozoal Infection in Northern Provinces, Nigeria.** [MANNING (F.), Principal Medical Officer.]—Received in Colonial Office Mar. 23, 1914.

The report contains an account of the results of an examination of 1,157 persons in 10 stations in Northern Nigeria for worm infections. Of these 601 or 52 per cent. were found infected. The table below shows the results at a glance.

TABLE "A."

District or Station.	Nos. examined.				Infected.			*Classification of Entozoal Infection.						
								Nematoda.						
	Soldiers.	Prisoners.	Others.	Total.	Number.	Percentage to Total No. examined.	Cestoda.	Ascaris lumbricoides.	Oxyuris vermicularis.	Strongyloides.	Ankylostoma.	Trichocephalus.	Schistosoma.	Other Entozoa.
Lokoja	—	200	40	240	175	73	67	12	27	5	108	4	3	5
Katagum ..	64	25	—	89	37	42	10	4	—	2	20	—	1	—
Ibi	—	42	—	42	29	69	1	2	—	2	23	1	5	—
Yola	—	40	32	72	22	31	10	4	—	—	1	1	—	6
Baro	—	—	36	36	14	40	3	5	—	—	11	2	—	—
Abinsi	—	—	23	23	9	39	2	1	—	—	3	—	—	3
Naraguta ..	—	—	90	90	32	35	18	4	—	—	7	1	—	2
Zaria	—	143	—	143	51	35	—	—	—	—	51	6	—	3
Zungeru ..	—	340	—	340	201	59	47	15	31	4	168	14	—	—
Ankpa	—	82	—	82	31	38	8	13	—	2	27	3	—	1
Totals ..	64	872	221	1157	601	52	166	60	58	15	419	32	9	20

*Includes dual and triple infection.

C. M. W.

MATHIS. **L'Helminthiase, le Goitre, la Lèpre dans la haute Région du Tonkin (Langson-Caobang).**—*Ann. d'Hyg. et Méd. Colon.* 1914. Jan.-Feb.-Mar. Vol. 17. No. 1. pp. 197–215.

As a result of the examination of a great number of natives of Upper Tonkin the author finds that helminth infections are exceedingly common as shown by the following table.

	Per cent.
Ascaris lumbricoides	60
Trichocephalus trichiuris	60
Necator americanus	30
Clonorchis sinensis	5

Anguillula intestinalis, *Taenia inermis*, and others, are less commonly found.

The most serious symptoms have been noted in connection with the Ascaris infections. Usually there are none, but occasionally there

is severe gastro-intestinal disturbance and in one fatal case perforation of the intestine, leading to general peritonitis and migration of the Ascaris into the peritoneal cavity, was noted. The authors frequently, with good results, gave santonin to individuals suffering from fatigue and showing vague intestinal symptoms. The dose given was 0·1 to 0·2 gram on three successive days just before the evening meal. On the fourth day 30–40 grams of castor oil were administered.

C. M. W.

Parrot (L.). **Parasitisme intestinal chez les Arabes du Tell algérien. Présence d'***Hymenolepis nana.*—*Bull. Soc. Path. Exot.* 1914. Apr. Vol. 7. No. 4. pp. 301-303.

At Duzerville in Algeria the author examined 767 adult males for intestinal infections during March, April, May and December 1913, and January and February 1914. Of these 245 harboured helminths. Trichocephalus occurred in 22 per cent. (associated with *Ascaris lumbricoides* in 4·5 per cent.), *Ascaris lumbricoides* in 11 per cent., *Oxyuris vermicularis* in 0·4 per cent., *Taenia saginata* in 0·4 per cent., *Hymenolepis nana* either alone or in association with other worms in 1·5 per cent.

C. M. W.

Neligan (A. R.). **Helminthemesis.** [Correspondence.]—*Lancet.* 1913. June 6. p. 1649.

Attention is drawn to the frequency of the vomiting of round worms in Persia. The writer points out that the vomiting may be accompanied by such general disturbance as to lead to a diagnosis of much more serious maladies as for instance meningitis. Worm infections are exceedingly common amongst the Persians and in the north of Persia the common forms are *Ascaris lumbricoides*, *Oxyuris vermicularis* and *Taenia saginata* in this order of frequency.

C. M. W.

Macht (David I.). **Two Cases of Helminthemesis (from the Out-Patient Department of the Johns Hopkins Hospital).**—*Johns Hopkins Hospital Bull.* 1914. Apr. Vol. 25. No. 278. p. 132.

Of the two cases recorded one was a man aged 25 who vomited a worm which was probably *Ascaris lumbricoides* as, after santonin treatment, some ten or twelve of these were passed per rectum ; the second case was in a woman aged 21 who vomited a portion of a tape worm about one and-a-half yards long. The shock of this induced a miscarriage.

C. M. W.

Lima (Armando R. V.). **Meio rapido para Revelar Ovulos de Parasitas intestinaes nas Fezes.** [A Rapid Method for Demonstrating the Eggs of Parasites in Stools.]—*Brazil Medico.* 1913. Oct. 22. Vol. 40. p. 427.

The author describes the following modification of Telemann's method for demonstrating the ova of parasites in stools. By the

original method portions of faeces of the size of a pea are shaken up with a mixture of equal parts of ether and hydrochloric acid. After passage through a sieve in order to strain off the grosser particles of food, the liquid is centrifuged for a minute. On standing, three layers are obtained, the uppermost consisting of ether and fatty substances dissolved in it, the second containing solid matters floating in the acid solution, the third a precipitate consisting mainly of fragments of cellulose, muscle fibres and the eggs of parasites. Whilst finding this method serviceable the author thinks it a great improvement to substitute distilled water for the acid used by Telemann, as the ova and worms, if present, are then much more perfectly preserved.

J. B. N.

Archiv für Schiffs- und Tropen-Hygiene. 1914. Apr. Vol. 18. No. 8. p. 292. **Oleum chenopodii als Antihelminthikum.**

A correspondence with Dr. Wendlandt on the use of Oleum chenopodii. Children and adults take it well but when the urine contains albumin care must be exercised in its administration. It has acted very well against *Ascaris lumbricoides*, *Oxyuris vermicularis* and *Ankylostoma duodenale*. Three doses of 4–16 drops (according to age) in syrup are given at 8, 9, and 10 o'clock in the morning, followed at 11 by a dose of castor oil. Eight days later the treatment is repeated and in certain cases a third treatment may be necessary.

C. M. W.

Serum Reactions, Toxins, &c.

Rachmanow (A.). **Lésions du Système nerveux dans l'Intoxication vermineuse.** *Ann. Inst. Pasteur.* 1914. Feb. Vol. 28. No. 2. pp. 181-193. With 6 text figs.

The author has attempted by experimental means to find out if helminthic toxins produce lesions of the central nervous system. He has inoculated guinea pigs with the body cavity fluid of *Ascaris megalocephala*, extract of *Taenia plicata* and extract of sclerostomes of the horse. He has examined animals which have had repeated doses of the toxins and also animals which have had what he terms indirect intoxication or helminthic anaphylaxy.

He arrives at the following conclusions :—

1. The central nervous system of guinea-pigs does not always react to the toxins. Lesions are only found in cases in which clinical signs of poisoning were seen during life. Some animals can absorb considerable quantities of the toxins without showing any lesions whatsoever.

2. Where lesions occur in mild or subacute intoxication the nerve cells, the neuroglia cells and the fibres are all involved. Apart from varying degrees of chromatolysis the nerve cells often show a series of sinuous channels in their protoplasm. In more serious cases the nucleus is displaced to the periphery of the cell and has a deformed nucleolus. In severe cases the neurofibrils have disappeared. The cells of the neuroglia show varying degrees of "amoeboid" transformation. In severe cases abnormal numbers of neuroglia cells are collected about the nerve cells. The fibres of the white matter are swollen and have an irregular appearance.

3. In anaphylaxy of short duration (3–10 minutes) lesions of the brain and cord are not found. If, however, it has lasted half an hour or longer the same changes are found as in the case of subacute intoxication.

4. Anaphylaxy produced by horse serum exhibits exactly comparable lesions.

5. As the lesions of the nervous system produced by anaphylaxy are more marked than those resulting from direct intoxication it is probable that when nervous symptoms appear in cases of helminthic infection these are due to anaphylactic phenomena.

C. M. W.

Weinberg (M.) & Séguin (P.). **Propriétés phagocytaires de l'Eosinophile. Absorption de l'Antigène hydatique par les Eosinophiles démontrée par la Réaction de Fixation.**—*Compt Rend. Soc. Biol.* 1914. May 8. Vol. 76. No. 15. pp. 715-717.

1. Further experiments on the phagocytic activity of the eosinophile cells are recorded. By injecting extracts of helminths into the peritoneal cavity of guinea-pigs an exudate rich in eosinophiles is produced. Into the cavity is then injected in saline solution a culture of *B. subtilis* or *B. coli*. It was found that the bacilli were all taken up by the eosinophiles before the polynuclear cells commenced to show any phagocytic phenomena. Similarly a subcutaneous eosinophilia was produced by injecting toxins subcutaneously. Shortly after the bacilli were injected into the same area and were again ingested by the eosinophiles. A marked eosinophilia in the blood can also be produced by injecting the helminthic toxins intravenously and the phagocytic powers of the eosinophiles can be demonstrated here also by injecting the bacilli intravenously.

2. In a previous publication the authors showed that the eosinophiles absorbed the toxins of helminths. They now record further observations in favour of this view. By using hydatid fluid they have shown that, in contact with the cells of peritoneal exudate which has been drawn off from guinea-pigs, the toxic properties are lost more rapidly when the exudate cells are in large proportion eosinophiles. Guinea-pigs may suffer naturally from an eosinophilia of the peritoneal fluid, but in this case the absorption of the toxic substances is not nearly so rapid as in the case of the peritoneal eosinophilia produced by intraperitoneal injections of helminthic toxins.

C. M. W.

Weinberg (M.) & Ciuca (A.). **Anaphylaxie Hydatique Passive et Serodiagnostic de l'Echinococcose.**—*Compt. Rend. Soc. Biol.* 1914. Mar. 6. Vol. 76. No. 8. pp. 340-342.

The authors have investigated from the point of view of anaphylaxy a total of 70 cases in which the clinical symptoms led to a suspicion of hydatid disease. The cases are divided into three groups. In the first group (20 cases) the serum of the patients gave a positive fixation reaction. In the second group (3 cases) the reaction was negative, while in the third group (36 cases) the diagnosis was discovered to be erroneous. Of the cases in the first group the serum of 18 produced in guinea-pigs a condition of passive anaphylaxy, while the serum of two was negative. The serum of two of the cases in the second group

produced a very decided anaphylaxy in the guinea-pigs. The sera of all the cases in the third group were negative. As a result of these observations the authors conclude that the production or not of anaphylaxy in guinea-pigs by the sera of patients will be useful in diagnosis of hydatid disease.

C. M. W.

Guerrini (Guido). **Della Emoeosinofilia nelle Infestioni Intestinali Zooparassitarie.** [Eosinophilia in Helminthic Intestinal Infections.] —*Arch. de Parasit.* 1914. May. Vol. 16. No. 3. pp. 337-363. With 4 text figs.

The paper contains an account of experiments on pigeons and fowls with reference to the eosinophilia produced by helminthic infections due to *Heterakis maculosa*. As a result of these investigations the author finds that—

1. Heterakis infections of the intestine are able to give rise to an eosinophilia as high as 28·8 per cent.

2. The eosinophilia is the result of the worm infection for it disappears if the gut is cleared of worms by antihelminthic treatment.

3. The inoculation into the intestine of large quantities of extracts of the worms never produces an eosinophilia.

4. A marked eosinophilia can be produced by experimental injury of the intestinal mucosa by cauterisation with boiling liquid or wounding by the insufflation of powdered silica or glass.

5. It is very probable then that the eosinophilia found in Heterakis infections is due rather to the intestinal condition produced by the worms than to the action of substances elaborated by them and absorbed by the host.

C. M. W.

Miscellaneous.

Moss (Morris I.). **Intestinal Parasites (*Strongyloides intestinalis*) with Unusual Symptoms.**—*New York Med. Jl.* 1914. May 23. Vol. 99. No. 21. pp. 1035-1337.

The author describes the case of a man, aged 50 years, who had had several asthmatic attacks during the past 8 or 10 years. About 5 days before he was seen by the author the patient had an attack of dyspnoea which lasted a day. This was followed by diarrhoea alternating with constipation. There was great difficulty in urination. When seen the patient was suffering from spasm of the sphincter and on the seventh day after admission this became violent and ether had to be administered. The spasm was repeated more violently three days later so that the patient became cyanotic and showed symptoms of dyspnoea and inflammatory oedema. Nothing could be found to account for the condition. The blood condition showed anaemia and leucocytosis with eosinophilia. On examination of the faeces living Strongyloides were found. Treatment with Filix-mas and Thymol was without result. The patient became worse and died in an attack for which no cause other than the Strongyloides could be discovered.

C. M. W.

Walker (Ernest Linwood). **The Life-History of *Oesophagostomum apiostomum*; 1. Development outside of the Host.**—*Philippine Jl. of Science.* Sect. B. Trop. Med. 1913. Dec. Vol. 8. No. 6. pp. 501-505. With 4 plates.

In 1905 Brumpt reported a case of oesophagostomiasis in a negro from the Omo River, East Africa. Railliet and Henry (1905) named the worm *Oesophagostomum brumpti* while in 1910 they named another species *O. stephanostomum* var. *thomasi* found by Thomas in a native of Manaos, Brazil. Leiper in 1911 found six worms amongst others which had been collected by Foy from a native of Ibi, Northern Nigeria. Leiper described these as *O. apiostomum* Willach 1891 a species common in apes. He believes also that *O. brumpti* belongs to this species.

The disease in man is characterised by haemorrhagic cysts or tumours in the submucosa or muscularis of the large intestine which project both inside and outside the gut. At maturity the cyst ruptures and the adult worm escapes into the lumen of the gut. The author of the paper under review has studied the infection of *O. apiostomum* in monkeys in the Philippine Islands.

The mature worm in the gut passes eggs which resemble those of the hookworm but are larger, measuring 0·044 to 0·057 millimeter in breadth and 0·073 to 0·084 millimeter in length. If powdered charcoal and, if necessary, a little sterile tap water are added to the faeces and the whole thoroughly mixed and spread in a thin layer in a sterile Petri dish, development will take place as in the case of hookworm ova. In such cultures the ova hatch in 12–24 hours and give rise to a rhabditiform larva 0·34 millimeter in length by 0·016 millimeter in breadth. The larva can be distinguished from other similar larvae of the hookworm or Strongyloides by its extremely long filiform tail and by the zigzag course of the intestine. The larva grows rapidly and moults twice during the next 3 or 4 days. At the second moult the skin is not shed but remains as an enclosing sheath within which the larva contracts somewhat in length and breadth so that it appears separated from the sheath by a space. The long filiform tail represented on the sheath vanishes at the last moult while the oesophagus has changed from the rhabditiform to the strongyliform. The larva is now ready to infect a new host. It measures 9 millimeters long by ·03 millimeter broad. The mode of entry of the larvae into the vertebrate host is not at present known but the matter is under investigation by the author.

C. M. W.

Bernard (P. Noël) & Bauche (J.). **Influence du Mode de Pénétration cutanée ou buccale du *Stephanurus dentatus* sur les Localisations de ce Nématode dans l'Organisme du Porc et sur son Evolution.**—*Ann. Inst. Pasteur.* 1914. May. Vol. 28. No. 5. pp. 450-469. With 1 coloured plate and 2 figs.

This paper contains an account of investigations undertaken in Annam with the object of finding out the method of entry into the body of the pig of the worm *Stephanurus dentatus* which infects in Annam 34·6 per cent. of the pigs killed for food. In Annam the para-

site is harmless but in other parts of the world it has been described as exceedingly pathogenic. It occurs in the fatty tissue about the ureters and kidneys, sometimes in the liver and rarely in other organs. The eggs occur in the urine and for experimental purposes were obtained by centrifugation of urine removed from the bladder. Twenty-four hours after their introduction into water the eggs rupture and an embryo emerges. Five days later it undergoes metamorphosis and appears as a sheathed larva, which may survive as long as 50 days. If a drop of such culture is placed on the skin of the pig the larvae become actively motile and congregate about the openings of the hair follicles. Constant applications of the culture to the skin of the pig gives rise to a papular eruption like that produced by the larvae of the ankylostoma.

As a result of their investigations the authors find that infection may take place by way of the skin or by way of the digestive tract. The skin route leads to perirenal and periurethral infection, while the other leads to infection of the liver. Only those worms which occur about the ureters and kidneys attain maturity so that this is the situation of choice in the life-history of the parasite.

C. M. W.

Book Review.

Van Brero (P. C. J.). [Vorm. Direktor der Staatsirrenanstalt zu Lawang (Java)]. **Die Nerven- und Geisteskrankheit in den Tropen.** [Nervous and Mental Diseases in the Tropics. Mense *Handbuch der Tropenkrankheiten.* 2nd Edit. Vol. 2. pp. 679-726. 1914. [Leipzig, Verlag von J. A. Barth.]

Dr. Van Brero contributes a comprehensive and interesting monograph on nervous and mental diseases in the tropics. The article is based upon long experience at the State Asylum of Lawang, Java, combined with an extensive research on the literature of the subject. The author says: "Apart from Lepra and Beriberi—if we can consider these as nervous diseases—our knowledge is scanty concerning the extent and the nature of the symptoms and etiology of the various nervous diseases affecting people inhabiting tropical countries; the reason being that sufferers from these diseases seldom come under the care of European doctors." Such diseases as admit of a rapid diagnosis, for example, epilepsy and the residua of cerebral and spinal paralysis, are not so rare; and various functional neuroses, for example, hysteria have been described as occurring among primitive and semi-civilized races inhabiting tropical and sub-tropical countries. It is not surprising to learn that Wittenberg met with tabes, multiple sclerosis, neuralgias, facial tic, hysteria, and epilepsy in South China.

The author refers to a still unexplained nervous disease described by Wellman in Angola, Portugese West Africa, which is named by the inhabitants "Akatama." Apparently this is a form of neuritis, the symptoms of which are numbness, burning and stabbing pains in the limbs and erythema of the skin; it has nothing to do with beriberi; it may affect children or Europeans, but the native carriers whose principal source of nourishment is badly-cooked maize, are specially liable to it. Balfour saw a similar form of disease, called "Lahmes Kamel," in the Soudan. Dr. Van Brero states that neurasthenia is very prevalent among Europeans in the tropics. This is not entirely due to climatic conditions; other causes are frequently at work, e.g., malaria with prolonged treatment by quinine; alcoholism; and constipation with auto-intoxication. He points out, however, that long residence in the tropics lowers a European's resistence against alcohol and tobacco, and quotes Tales who states that one half of the American women and thirty per cent. of the men suffer with neurasthenia after a year's residence in the Philippines. A very interesting account is given by the author, from his own experience in Java, of the influence of a tropical climate on the physical conditions of Europeans born and reared in the tropics, and he remarks that an absolutely perfect example of a third generation of a tropical full-blooded European is unknown.

A description is given of Latah, a functional paroxysmal nervous disease brought on by fright, in which the patients are compelled, against their will and in spite of a feeling of repugnance so to do, to perform acts of deed and speech. The disease is met with especially in the Malayan Archipelago but is also found in other countries. An analogous disease, "jumping," has been described in the United States, Siberia and Lapland, so that it is not strictly speaking a tropical disease. A typical case is described by O'Brien:

> "A Malay cook on board a local steamer, the butt of the crew on account of his disease, was daily subjected to their clumsy wit. One day as this cook was dangling his child, one of the crew came and stood before him with a billet of wood in his arms, which he began to toss up to the awning and catch again. The cook tossed his child up also, time for time. At last the sailor opened his hands wide apart and let the wood fall upon the deck. The cook immediately imitated him, missed the catch, and allowed the child to fall heavily upon the planks, from which it was picked up quite dead."

Van Brero points out that in Latah there is no amnesia, and the intelligence is unimpaired. Whether this applies to the disease during the height of paroxysm is doubtful. A hereditary predisposition exists in the sufferers

from this disease, a fright or a dream being only an exciting cause. It resembles in many respects hysteria, and is a neurosis in which suggestion plays an all-important part. Probably it affects the Malayan race in consequence of a predisposing mental constitution.

Van Brero devotes a page to "Tropenkoller," an expression used for a peculiar mental condition, said to arise in Europeans who live among savages in the tropics. It is said to follow malaria, heat stroke and general debilitating causes, but the condition is rather a criminal delinquency than a mental disease, and PEIXOTO describes it as "*fantasie des auteurs allemands exclusivement* made in Germany." Von Brero thinks that the principal cause of tropical frenzy is the personality of the individual when unrestrained by social conditions.

A chapter is devoted to heat-stroke, sun-stroke, and heat exhaustion, and it is pointed out that the affection is rare in the Dutch East Indies. Three theories of sun-stroke are given. (1) The thermic theory that there is an accumulation of heat with its effect on the tissues causing paralysis of the heat-regulating centres. (2) The actinic theory. According to CASTELLANI and CHALMERS it is not the ultra-violet rays that are active, but the blue and violet. (3) The microbic toxic theory.

From his own observations and practical considerations Van Brero would divide these diseases into two groups—sun-stroke in which the light rays of the sun exercise a special action on the body; and heat exhaustion, where the excessive degree of heat is the cause. Naturally the two causes are often combined, but heat-stroke may arise from other causes than the sun's heat. He then gives a description of the symptomatology and course of sun-stroke and heat-stroke, and remarks that in the Dutch East Indies psychoses as the result of heat-stroke seldom occur.

The author points out the many difficulties which he encountered in estimating the character of psychoses in tropical countries owing to the varied nomenclature employed. The percentage of insane in tropical countries, (e.g. the Dutch East Indies) is unknown. Many other difficulties arise in ascertaining the nature of the psychoses and their prevalence among the natives. Difficulties of language and suspicion of the motives of Europeans render any investigation very difficult. He concludes, however, that social and environmental conditions, such as habits and customs, have a much more important influence than climate. He describes two curious psychoses, Schamanism and Amok. Schamanen are persons of both sexes who possess the supposed power of harbouring spirits. They are found in various parts of the world, under different guises. They have mystic ceremonies with incense, monotonous dances, song and music. They pass into a state of ecstasy and in this state they are given to prophetic utterances. Amok—'to run amok'—is not peculiar to the Malay race. BLANDFORD saw analogous murderous onslaughts among the coolies in Trinidad, where it was attributed to the use of Bhang. The "amok attack" may show itself as a symptom complex in various degenerative psychoses, epilepsy, periodic mania, imbecility and idiocy, which forms of insanity can be shown to exist in such individuals. Gillmore ELLIS sees in the runners of amok a symptom of masked epilepsy. Evidently "amok runners" are in a state suggesting that they are not responsible for their actions, for they say, "I knew not what I did, it was black, red, before the eyes," and that they saw a tiger, a stag, a swine, a dog, or the devil, which they ran through. The attack is preceded by a more or less stuporose condition and followed by the same or by a deep sleep which is very suggestive of epilepsy. But this does not explain the peculiarity of race affection, nor why women are so rarely affected.

The chapter on the psychoses is especially valuable because of the author's long experience at the asylum of Lawang, Dutch East Indies. He calls attention to the fact that necessarily the delusions and obsessions of the civilised insane are coloured by the events of the period, and therefore may vary day by day. It is quite otherwise with primitive or half-civilised races, where the events of one day follow another with unvarying monotony, which, with the low intelligence and ignorance of such people, permits only of delusions and obsessions of a simple rudimentary character.

Types of Insanity and their Rotation Frequency in Natives of the Dutch East Indies.

	Melancholia.	Mania.	Amentia.	Paranoia.	Hypochondria.	Hysteria.	Epilepsy.	Circul. Psychoses.	Period. Melanch.	Period. Mania	Period. Amentia.	Idiocy.	Imbecility.	Secondary Dementia.	Dementia paralytica.	Not diagnosed.	Totals.
Javanese ..	2	—	263	6	2	—	36	2	—	68	1	9	6	101	28	10	534
Sundanese ..	1	—	24	—	1	—	—	—	—	8	—	—	—	29	4	—	67
Madurese ..	—	—	23	1	—	—	1	—	—	3	—	—	—	6	1	3	38
Total ..	3	—	310	7	3	—	37	2	—	79	1	9	6	136	33	13	639
Percentage ..	0·5	—	48	1·1	0·5	—	5·9	0·3	—	12	0.16	1.5	1	21.3	5	2	—

DEATHS OF VARIOUS TYPES OF INSANITY AT LAWANG ASYLUM.

Cases of death in Natives at the Asylum, Lawang from July 1902 to May 1909.	Within 6 mos. or less than 6 mos.	Within 1 year.	Within 1½ years.	Within 2 years.	Within 2½ years.	Within 3 years.	Total.
Amentia	11	3	4	2	3	6	29
Periodic Mania ..	1	2	1	—	—	—	4
Paranoia	—	—	—	—	—	1	1
Hypochondria ..	—	—	—	—	—	1	1
Epilepsy	—	1	1	—	1	4	7
Idiocy	2	—	1	—	1	—	4
Secondary dementia ..	9	2	3	—	2	38	54
Dementia paralytica ..	7	3	6	—	—	4	20
Total	30	11	16	2	7	54	120

He noticed that masturbation, refusal of food, and suicide seldom occurred among the insane natives. Physical signs of degeneracy were most varied. Among the most obvious were anomalies of the skull and asymmetry. The insanities of the natives show characteristic indications of a degenerative neuropathy, e.g., periodicity, violent and dangerous outbursts, increased suggestibility. He gives two tables adopting the classification of MEYNERT, and showing the various types of insanity and their relative frequency, which are of sufficient interest to reproduce. It will be observed that amentia with stupor is comparatively frequent, secondary dementia and periodic mania are also common. An interesting fact observed is that "dementia paralytica" is met with in 5 per cent. of the admissions. Now it was said by Gillmore ELLIS that general paralysis is rarely if ever seen among Asiatics; it was also said that it did not exist in Egypt although syphilis was very prevalent, but we know now that over 6 per cent. of the admissions to the Cairo Asylum are general paralytics. Again, in Japan the incidence of general paralysis in Tokio Asylum has risen from 1·5 per cent. in 1888, to 15 per cent. in 1906. Van Brero explains why KRAEPELIN saw no paralytics at Buitenzorg. Probably in a measure it is a question of diagnosis and the difficulties attending the same, owing to the symptoms not being so characteristic; e.g. grandiose delusions are not so marked in the natives and mixed races as in the Europeans. Of 120 deaths in the Lawang Asylum (as the table shows) 20 were paralytics—1 in 6—relatively a normal percentage for the incidence of syphilis. Syphilis we know is the essential cause of general paralysis; if there were no syphilis there would be no general paralysis; and there can be no doubt that amongst savage and semi-civilised races where syphilis is very widespread and where skin and bone diseases are very common, general paralysis and tabes—these late manifestations of spirochaetal invasion—are rare. So that although it is not absolutely true to say that syphilitic infection with well-marked skin eruptions will not end in general paralysis, yet experience in countries where general paralysis is extremely common, supports the idea that cases which have well-marked skin and bone lesions do not subsequently develop general paralysis. Has the organism become modified owing to the widespread use of mercury in civilised countries, or is the dictum of KRAFFT-EBING true, "That general paralysis is a product of civilisation and syphilisation"?

The author next discusses malaria and, following KRAEPELIN, he divides the psychoses into three types: (1) "the pernicious delirious fever," with symptoms of headache, giddiness, noises in the ear and slight stupor occurring as prodromal symptoms, with a remitting or continous course, mental confusion, delusions of persecution, hallucinations and illusions, restlessness with a tendency to suicide, passing on to coma, spasms, collapse and death, or sleep with more or less complete amnesia. These

symptoms occur sometimes before the feverish attack, or mostly end with it, or continue until the next attack.

(2) The 'typical psychosis' caused by quartan and tertian fever with a purely intermittent character; fever may be absent and the patient suffers with mental confusion, anxiety and delusions accompanied by hallucinations, illusions, irritability and violent outbursts.

(3) Psychoses of "malarial cachexia" with terrifying hallucinations, delusions of persecution, sudden violent outbursts, stupor and gradual lowering of intelligence, but possibly resulting in a cure after six to ten months. He also describes a neuritis which may come on as the result of malaria.

Lepra and ankylostomiasis are briefly dealt with. He does not conside that beriberi is ever accompanied by a Korsakow's psychosis, as was asserted by RODRIGUEZ of Brazil.

The most important habit poison of Asiatics is haschisch. Different preparations of the female plant of the Indian hemp which go under the name of Charas, Bhang, and Ganjah, are used in British India, Arabia, Asia Minor and adjoining countries of North Africa, and play a very important part in the production of mental disease in Mohammedan countries. Their psychic action may be divided into two stages. The first lasts about a quarter of an hour and consists of emotional excitement; this gives place to the visionary stage in which perceptual and memory pictures rise up in the mind's eye. This intoxication lasts two or three hours and rarely results in any unpleasant after-effect, as for example, vomiting. Consciousness is not thereby lost, for the patient is able to do unskilled work while under its influence, thus favouring the acquirement of the habit. Memory is disturbed after the intoxication, but in any case there is a feeling of pleasure such as occurs after pleasant dreams. There are three forms of mental disorder produced by the haschisch habit, (1) the acute hallucinatory form, (2) the acute motor form, and (3) the chronic form. WARNOCK has shown that Haschisch intoxication is a very widespread and common condition in Egypt, and that it plays the same part there as a factor in the production of insanity as alcohol does in England. It produces a moral depravity not unlike that of chronic alcoholism and this "Cannobinomania," as WARNOCK designates it, is a veritable plague to the people.

In conclusion I may mention that there is no reference to the nervous and mental symptoms of pellagra and trypanosomiasis. Probably they are dealt with fully in the articles on these important subjects. A full bibliography of references is given at the end of this valuable and interesting monograph on an extremely difficult subject.

F. W. Mott.

By Royal Warrant to H.M. the King.

IZAL

A TRIUMPH OF CONCENTRATION.

The pioneer modern high-power germicide. Officially adopted throughout the British Empire. Uniform germicidal power guaranteed. Mixes equally well with soft, hard and brackish, or salt water.

MEDICAL IZAL

Specially prepared for Medical and Surgical work. Used with marked success as an intestinal antiseptic in the treatment of Dysentery, Enteric Fever, Cholera, etc.

IZO-IZAL

A combined germicide and pesticide. Unrivalled for the destruction of insects and larvae, and microbes, at one operation. 1 part in 30,000 destroys mosquito larvae.

AGENCIES THROUGHOUT THE EMPIRE.

Samples and Scientific Reports sent free on application to the Manufacturers:

Newton, Chambers & Co., LTD.,

THORNCLIFFE, near SHEFFIELD.

BUREAU NOTICES.

Works in the Bureau Library may be consulted between 10 and 5 30.

The Director can be seen between 10 and 1; for a later hour an appointment should be made.

The Director will be glad to receive early copies of works or reprints on Tropical Diseases for notice in the *Bulletin* and for the Library. To be addressed—Tropical Diseases Bureau, Imperial Institute, London, S.W.

(Telephone:—Kensington, 5188.)

Reprints of Papers have been received from:—

AUERHANN (Dr. W.); BAERMANN (Dr. G.); BASILE (Dr. C.); BLÜHDORN (Dr. K.); BRADDON (Dr. W. L.) & COOPER (Dr. A. E.); BRAULT (Professor J.); CARINI (Professor A.) & MACIEL (J. J.); CICCONARDI (Dr. G.); Van DONGEN (J.); GAMBLE (Dr. M.); HONEIJ (Dr. J. A.) & PARKER (R. R.); JABLONS (Dr. B.); Van LOGHEM (Dr. J. J.) & SWELLENGREBEL (Dr. N. H.); LOISELET (Professor); NÖLLER (Dr. W.); RIBEYRO (Dr. R. E.); MACKEHENIE (Dr. D.) & ARCE (Dr. J.); SCHOTTMÜLLER (Dr. H.); SERGENT (Dr. Edm.); STARGARDT (Professor Dr.); VIOLLE (H.); YORKE (Professor W.) & BLACKLOCK (Dr. B.).

The Annual Subscription for the Tropical Diseases Bulletin is TWENTY-ONE SHILLINGS post free.

Subscriptions should be sent to Messrs. BAILLIÈRE, TINDALL and COX, 8, Henrietta Street, Covent Garden, London, W.C., who are also the advertisement agents.

The Bulletin appears, as a rule, twice a month.

Cloth cases for binding the Bulletin can be obtained from Messrs. BAILLIÈRE, TINDALL and COX, price One Shilling and Sixpence post free.

The Tropical Diseases Bureau publishes also the TROPICAL VETERINARY BULLETIN, quarterly, Annual Subscription Ten Shillings, single numbers Three Shillings post free; to be obtained from the above agents.

TO ADVERTISERS.

To ensure the insertion of an Advertisement in any particular number of the Bulletin the copy must reach Messrs. BAILLIÈRE, TINDALL & COX not later than ten days before the date of publication, i.e., by the 5th or 20th of each month for insertion in the issue of the 15th or 30th respectively.

CONTENTS.

SLEEPING SICKNESS.

PAGE.

BRUCE, HAMERTON, WATSON & Lady BRUCE : Studies on a Zululand strain of *T. brucei*.. 61-64

BRUCE, HAMERTON, WATSON & Lady BRUCE : Development of the Human Nyasaland Trypanosome in *G. morsitans* .. 64

YORKE & BLACKLOCK : Identity of *T. rhodesiense* with the Trypanosome of Game in Nyasaland 66

KLEINE, FISCHER & ECKARD : Infection of Salivary Glands in Tsetse Flies 67

QUANTZ : First Clinical Symptoms in Trypanosomiasis.. .. 69

VORWERK ; LURZ : Salvarsan in Treatment 69-70

MESNIL & ROUBAUD ; TODD : Prophylaxis of Trypanosomiasis 71-72

PRINCIPE : Report of Sleeping Sickness Commission 73

ZUPITZA : Experiments on Catching Tsetse Flies (fig.) 74

NEWSTEAD & DAVEY : Bionomics of *G. morsitans* 75

GRAHAM & HUTCHISON : Influence of Trypanosomiasis upon the Body Temperature of Rats 75

TERRY : Influence of Heat upon the Trypanocidal Action of Blood containing transformed Atoxyl 76

TERRY : Variations in Toxic Effect of Transformed Atoxyl on Trypanosomes in Vitro, etc. 76

MALARIA.

DARLING : Studies on Malaria in the Canal Zone.. 78

von EZDORF : Malaria in the United States 82-83

SHOULDERS : Malaria as a Public Health Problem 83

BASS : Treatment and Cure of Malaria 83

BOOTH : Malaria during the First Three Months of Life.. .. 83

DEADERICK : Factors in the Prevention of Malaria 83

CARTER : Quinine-fast Malarial Parasites.. 83

LEGER : Malaria in the Upper Senegal and Niger.. 83

SERGENT : Malaria Prophylaxis in Algeria 84

ORTA ; SAITTA ; SERGI ; Malaria in Italy and Sicily 84

SERGI : The Mosquito Theory and Malaria 84

ROWLEY-LAWSON : Migration of Adult Tertian Malarial Parasites 85

THOMSON : Origin and Development of Crescents 85

HENSON : Man the Principal Etiologic Factor in Malaria .. 86

BASS : Congenital Malaria.. 86

FUCHS-WOLFRING : Malarial Relapse after Tuberculin Treatment 87

RODENWALDT : Immunity from Malaria in Negroes 87

MATHIS : Malaria Epidemic in French Cochin China 87

SCHÜFFNER & SWELLENGREBEL : Anophelines in Deli.. .. 87

CHIMISSO : Cutaneous Manifestations of Malaria 88

EMIN : A New Variety of Malarial Parasite 88

BUTTERFIELD & BENEDICT : Hematin in the Production of Malarial Paroxysms 89

MALISCH : Malaria in South-East Germany 89

BRADDOCK : Tropical Malaria and its Causes 89

FISCH : Malarial Prophylaxis in Kamerun 90

BOSCO : Thick Films in Diagnosis of Malaria 91

FRASSETTO : Presence of Autolysins in Malarial Blood.. .. 91

TRESIDDER : Malarial Coma 92

ROSS : Intramuscular Injections of Quinine 92

PEIPER : Treatment of Malaria with Hydroquinine 92

CLARENC : Methods of Administering Quinine.. 93

BAERMANN : Action of Hydroquinine in Malaria 93

CONTENTS—*continued:*

MUEHLENS : Treatment of Acute Symptoms in Malaria 94
POPE : Chronic Malarial Cachexia 94
SCHWYZER : Chronic Malaria 94
SEIDELIN & CONNAL : Plasmodia in West African Monkeys .. 95
ERRATUM 95

BLACKWATER FEVER.

GRIENWANK : Blackwater Fever in French West Africa .. 96
VINSON : Blackwater Fever with Cerebral Complications .. 96

HELMINTHIASIS.

SSIMINTZIN : Biology of *F. hepatica* 97
NAKAGAWA : Development of Ova and Embryos of *Distoma pulmonalis* 97
PONS : Paragonomiasis 98
CONOR : Transmission of *S. haematobium* 98
HOOTON : A Case of Bilharzia Disease 98
BALFOUR : Febrile Intestinal Schistosomiasis in Venezuela .. 99
CHASTANG : *S. japonicum* Infections and Yangtse Fever .. 99
ROSSI : Pathogeny of *Taenia nanum* Anaemia 99
BLANCHARD, LEROUX & LABBÉ ; VINCENZO : Cases of *Dipylidium caninum* Infection in Man 100
STUART : Hydatid of the Omentum 100
CASAUX : Hydatid of the Liver in Annam 100
DUNBAR-BRUNTON ; LOOSS : A Supposed Case of Ankylostoma Infection 101
BLIN : Ankylostomiasis among Gold Miners and Convicts in French Guiana 101
GILL : Hookworm Disease in Porto Rico 102
LEVY : Treatment of Ankylostomiasis with Oil of Chenopodium 103
CARINI : Suggested Campaign against Ankylostomiasis in Brazil 103
RHO : Need for Ankylostomiasis Campaigns in the Tropics .. 103
De FARIA : On the Identity of *Agchylostoma ceylanicum* and *A. braziliense* 104
MACGREGOR : Ascaris Infection 104
BORINI : Pseudo-Appendicitis due to Ascarides 104
MANNING : Entozoal Infections in the Northern Provinces, Nigeria 105
MATHIS : Helminth Infections in Upper Tonkin 105
PARROT : Helminth Infections in Arabs in Algeria 106
NELIGAN ; MACHT : Helminthemesis 106
LIMA : A Rapid Method for Demonstrating Ova in Stools .. 106
ARCHIV FUR SCHIFFS- UND TROPEN-HYGIENE : Oleum chenopodii as an Anthelminthic 107
RACHMANOW : Lesions of the Nervous System produced by Helminthic Toxins 107
WEINBERG & SEGUIN : Absorption of Hydatid Antigen by Eosinophiles 108
WEINBERG & CIUCA : Hydatid Anaphylaxy and Serum Diagnosis of Hydatid Disease 108
GUERRINI : Eosinophilia due to *Heterakis maculosa* 109
MOSS : Case of *Strongyloides intestinalis* Infection with Unusual Symptoms 109
WALKER : Life History of *Oesophagostomum apiostomum* .. 110
BERNARD & BAUCHE : Mode of Entry into Pigs of *Stephanurus dentatus* 110

BOOK REVIEW.

Van BRERO : Die Nerven-und Geisteskrankheit in den Tropen (MENSE'S Handbuch) 112